...OGY DEPT.

GRINDING and FINISHING

AUGUST • 1959

IN THIS ISSUE:

Gaging for Grinding
Finishing Panels – Air Force Academy
Semi-automatic Gear Deburring

PUBLIC LIBRARY
AUG 19 1959

A HITCHCOCK PUBLICATION

To maintain rigid I. D. specifications

CORTLAND INTERNAL WHEELS

Whether the most important factor of your internal grinding operations is fine finish, close tolerance, rate of cut, form holding ability or uniformity, you can depend on CORTLAND wheels to give you the best results. Special bonds and abrasives have been developed for peak efficiency on specific applications in this type of grinding.

CORTLAND is ready to help you to reduce your abrasive costs by improving your grinding operations. Please feel free to contact us at any time for this assistance.

Winning Combination

We are proud of the know-how of Cortland people, many of whom have grown up in this business with us here in Chester. Team these skills with modern methods and materials, advanced laboratory and manufacturing techniques, constant controls, and you have the quality which represents extra value to our customers.

CORTLAND INTERNAL WHEELS

CORTLAND

CORTLAND GRINDING WHEELS CORPORATION
Chester, Massachusetts

Use postpaid card. Circle No. 201

WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

GRINDING and FINISHING

CONTENTS FOR AUGUST • 1959

Feature Articles

20 The How and Why of Gaging
Part I of a series on gaging for grinding, emphasizing the potentialities and limitations of gaging and bench marks for the selection of gages.
By Richard L. McKee

24 Straddle-Bearings Provided in New Centerless Grinder
Bearing supports on both sides of grinding wheel and regulating wheel feature design of new centerless grinder. Design also includes dual mobile wheel heads.

26 Finishes to Under One Microinch on Lathe
Attachment for tool post super-finishes flat or cylindrical surfaces to less than a microinch.
Special to GRINDING and FINISHING

29 Finishing Aluminum Panels for Air Force Academy
Large drum sander solves problems in surfacing panels of aluminum.

31 Semi-Automatic Gear Deburring Reduces Operations to Seconds
Reinforced wheel and air spindle in semi-automatic set-up slash time and costs for deburring large gears.
By M. M. Patterson

37 Abrasive Industry Leaders Brief Young Engineers
Unique three-week program covers the manufacture and use of abrasives for Alfred University ceramic engineering students.
Special to GRINDING and FINISHING

Departments

4 Letters
9 Editor's Page
11 Grinding Safely
12 Metalworking in General
15 Design for Grinding
19 You Asked
35 Ideas from the Shop
39 Literature
55 American Society for Abrasives
57 News of the Industry
65 A Final Thought

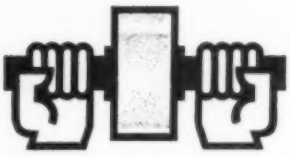
AUGUST COVER: Egyptian hieroglyphics, a micrometer spanning the world, a dial indicator and a guided missile were chosen by Vic Erickson to portray the background and the current state of gaging for grinding. Copy for the hieroglyphics was provided by the DoAll Company.

NEXT MONTH: September's lead article might be subtitled, "What every user should know about the making of vitrified grinding wheels." These are manufactured in a greater variety of sizes and shapes, and are more widely used, than any other type of grinding wheel. The cover hits the high-lights of the process.

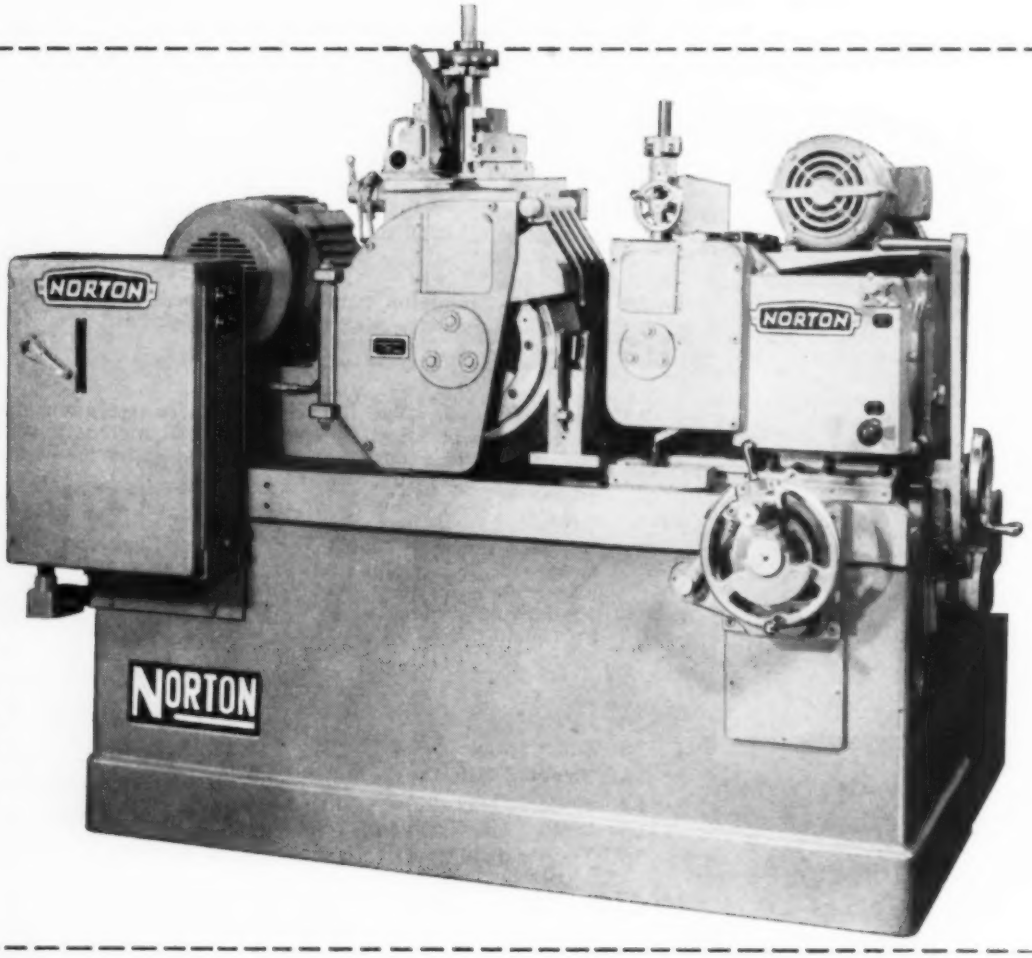
Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.
Copyright 1959, by Hitchcock Publishing Co., Wheaton, Ill.
Phone MOntrose 5-1000. Cable address: HITCHPUB Accepted as controlled circulation publication at Pontiac, Illinois.

Newest NORTON Grinder!

The No. 2 Straddle-Bearing

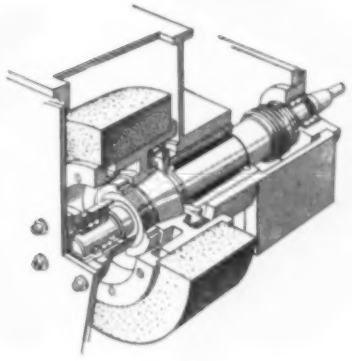


Centerless is built for speed . . .



Ready for Immediate Delivery
The new Norton No. 2 Centerless Grinder can be arranged for full automatic, semi-automatic or manual thru-feed or plunge grinding. Capacity includes work diameters ranging from 1/16" to 4 3/4" depending on type of work rest and bar grinding fixture.

3 MAJOR ADVANCEMENTS IN CENTERLESS GRINDING



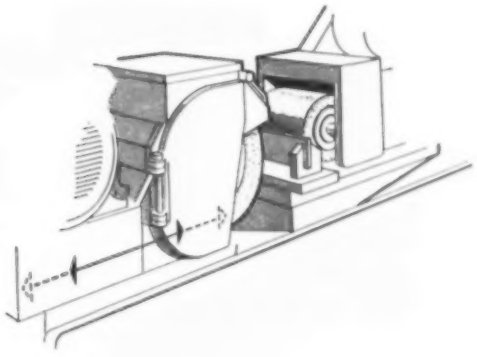
accuracy . . . economy

Straddle-Bearing Spindle Support, in both grinding and regulating wheels, provides extra strength. Combined with the inherent rigidity of Norton spindles this boosts capacity to take heaviest cutting pressures, while permitting fast grinding to close tolerances under all conditions.

Like all Norton grinders and lappers the Norton No. 2 *Straddle-Bearing* Centerless Grinder is built to deliver "Touch of Gold" performance — the Norton extra that adds value to your product while cutting your production costs.

You'll find plenty of proof of that in the modern construction of this newest machine of its type. *Straddle* support of spindle bearings adds strength and ability to take tough jobs . . . the mobile wheel head and constant work-loading alignment make jobs shorter and easier.

Many other features result in outstanding performance advantages. Call your Norton Sales Engineer, a trained expert in the grinding field, for consultation on how these features can benefit your production. Or write for Catalog 1328. NORTON COMPANY, Machine Division, Worcester 6, Mass.

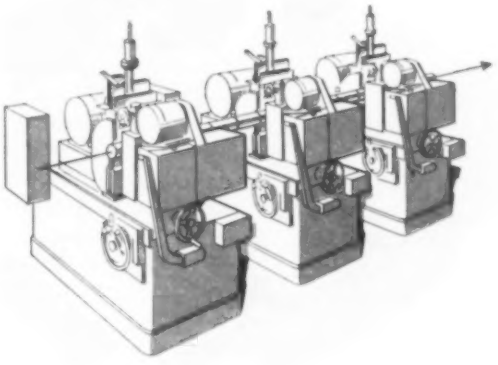


Mobile Grinding Wheel Head, with wheel mounted between head ways and feed screw located beneath wheel center for ideal balance, provides instant response to signals. This results in especially fast sizing, one of many important advantages over fixed head operation.

NORTON

GRINDERS and LAPPERS

District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit.
In Canada: J. H. Ryder Machinery Co. Ltd., Toronto 5.



Work Loading Alignment is never disturbed by wear of either grinding or regulating wheel . . . neither is the alignment of the work rest blade. Movable heads for both grinding and regulating wheels make this advantage possible . . . and especially time-saving in a battery set-up.

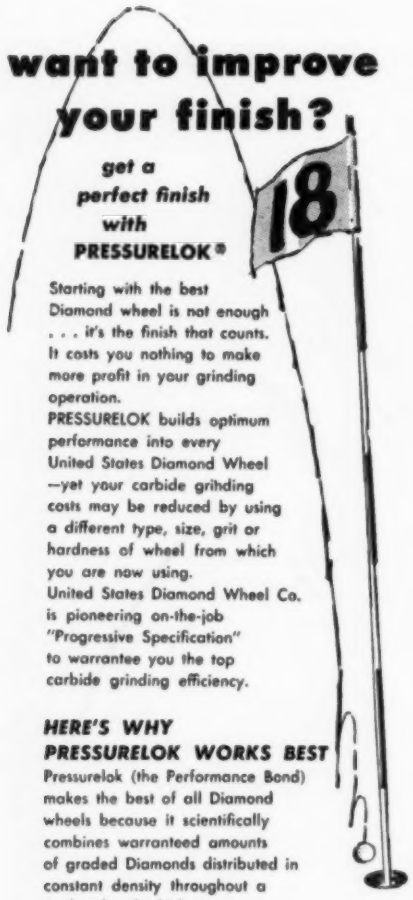
Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Use postpaid card. Circle No. 204

want to improve your finish?

get a perfect finish with **PRESSURELOK®**



Starting with the best Diamond wheel is not enough . . . it's the finish that counts. It costs you nothing to make more profit in your grinding operation.
PRESSURELOK builds optimum performance into every United States Diamond Wheel —yet your carbide grinding costs may be reduced by using a different type, size, grit or hardness of wheel from which you are now using.
United States Diamond Wheel Co. is pioneering on-the-job "Progressive Specification" to warrantee you the top carbide grinding efficiency.

HERE'S WHY PRESSURELOK WORKS BEST

Pressurelok (the Performance Bond) makes the best of all Diamond wheels because it scientifically combines warranteed amounts of graded Diamonds distributed in constant density throughout a perfect bond which wears uniformally at the ideal rate of Diamond usage.

be SURE. . .get PRESSURELOK®

THE PERFORMANCE BOND

This wheel is a precise duplication of your specification, warranteed when properly operated, to give you the lowest cost per cut of any wheel.

Write for our catalog No. 957 or call us at Aurora (Illinois) 7-9181 for "Progressive Specifications" on your job without any obligation on your part.

US UNITED STATES DIAMOND WHEEL CO.

835 ILLINOIS AVENUE AURORA, ILLINOIS

Use postpaid card. Circle No. 205

Editor's Mail

Grinding Turbine Blades At Grand Coulee Dam

We have read with interest your article in the June issue of GRINDING and FINISHING regarding grinding turbine blades at Grand Coulee (page 40).

We would appreciate knowing from what source you received this information and to whom we should apply so that we may run tests on this application.

I. L. Friedland
Pekay Abrasives, Inc.
Verona, N.J.

Increased Life Of Diamond Tools

We are interested in obtaining 25 or 50 copies of GRINDING and FINISHING's 1958 article on "Increased Life of Diamond Tools Through Orientation." If this is at all possible, will greatly appreciate your assistance.

C. A. Akeson
General Manager
Permattach Diamond Tool Corp.
Milford, N.H.

Built-In-Guards Cup Wheels

Would it be possible for you to forward reprint copies of articles in your March 1959 issue on the following: "The Case for Built-In-Guards Cup Wheels" and "R-r-right Face."

E. E. Lowe
Seattle, Wash.

Ultrasonic Cutting

We are engaged in materials research, and would like very much to know the work of Mr. Burton B. Stuart entitled "Eliminating Edge Breaking by Ultrasonic Cutting," published in your GRINDING and FINISHING, August 1958, pages 34-35.

Could you please forward to us a tear sheet or photostat of this paper together with any charges necessary . . . Thanking you in anticipation for your attention.

George Soares de Moraes
Centro Tecnico de Aeronautica
Sao Paulo, Brazil

Wall Chart

In your technical journal, GRINDING and FINISHING, in the edition of December 1958 we have read with great interest the article, "Wall Chart Aids Grinding Efficiency." Have the kindness to send us such a chart printed on cardboard and suitable for mounting on the wall.

Tyrolit Schleifmittelwerke
Swarovski K. G.
Schwaz, Tirol, Austria

Corrected Address

The article entitled "Tolerances and Finishes Require Clean Coolant," in the June issue of your publication GRINDING and FINISHING, describes a filter manufactured by the Alsop Engineering Corp., Aster Street, Milldale, Ohio.

As you will note by the enclosed envelope, our letter of inquiry to the above address has been returned for the reason given. Your cooperation in forwarding the enclosed letter to the proper address will be appreciated. We have enclosed our letterhead envelope for your completion and use.

Fred W. Gilbert
National Water Lift Co.
Kalamazoo, Mich.

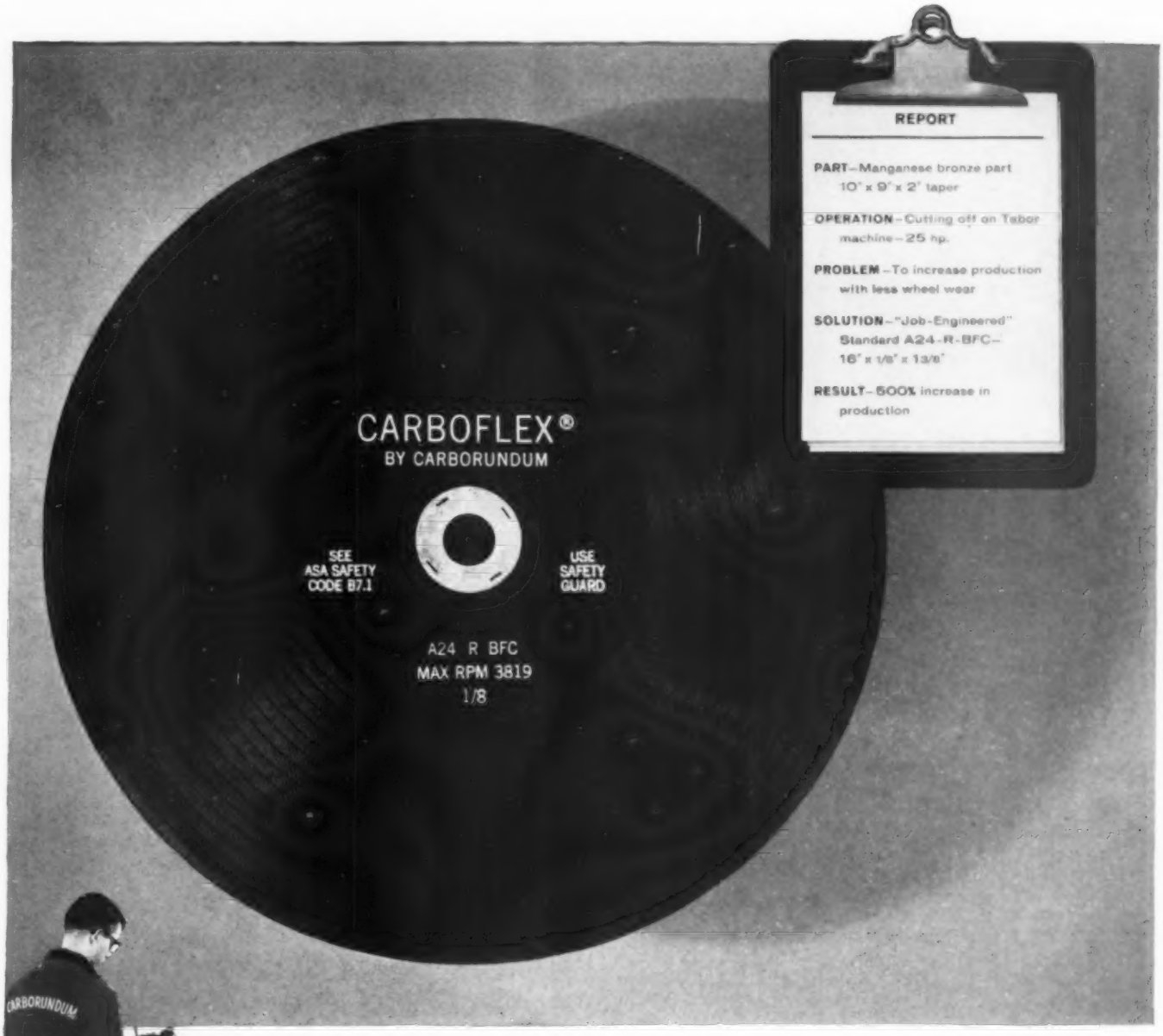
Should have been Milldale, Conn. Sorry!

Reprints Requested

I was greatly interested in seeing the two issues of GRINDING and FINISHING which you sent to Miss Margie Reser recently. Among the available reprints listed on page 77 of the April issue, there are several papers that I feel should appear in the Abrasives Section of **Ceramic Abstracts**: "Abrasive Cutting," "Better Diamond Dressing for Precision Grinding," and "How and Why of Abrasive Wheels."

I shall appreciate it if you will send us these reprints together with your invoice.

Mrs. Mary Gibb
Ceramic Abstracts
The American Ceramic Society, Inc.
Columbus, Ohio



500% more production with this standard reinforced cut off wheel

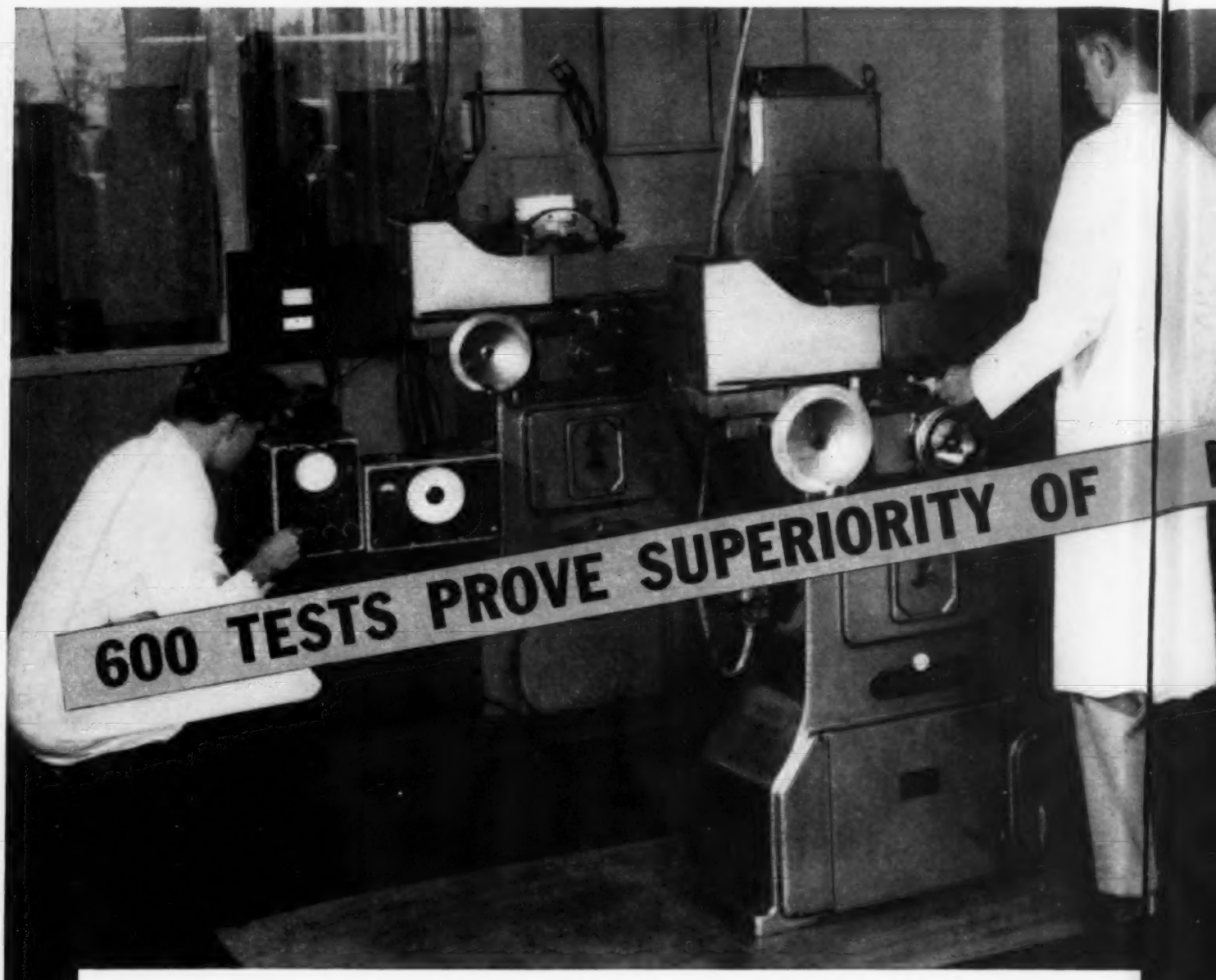
Reinforced Wheels are widely known for their unusual strength and resistance to wear and cracking in rough grinding and cut off operations. It is not unusual to find impressive production records such as this recent test of *standard* BFC cut off wheels by a large non-ferrous foundry. The test consisted of high speed cutting off of a manganese bronze part. A careful check of wheel loss per piece indicated that the BFC wheel lasted 5 times longer than previous wheels used. The result—*the customer now buys one Carborundum wheel in place of five of the others.* If you have a cut off problem, it will be to your advantage to select your wheel requirements from Carborundum's line of NATIONAL STANDARDS. Your Carborundum distributor maintains a complete stock of NATIONAL STANDARDS for immediate delivery. On your next order...

Specify "Job-Engineered" NATIONAL STANDARDS by

CARBORUNDUM
REGISTERED TRADE MARK

WRITE FOR YOUR CATALOG OF NATIONAL STANDARDS, Form A-1489 and prove to yourself how "Standards" can solve many of your abrasive problems. Send your request to The Carborundum Company, Dept. GF 81-95, Niagara Falls, N.Y.

Use postpaid card. Circle No. 206



30% TO 50% LONGER LIFE FOR RESINOID-BONDED DIAMOND WHEELS

Six hundred separate trials, using 145 wheels, were run by the Diamond Research Laboratory to test a completely new type of natural diamond grit for resinoid wheels. The results: this new grit increases the life of natural diamond resinoid-bonded wheels by 30% to 50%.

The particles of this new grit do not readily pull out of the bond. Instead, they break down into ever-finer fragments which constantly expose new, sharp cutting surfaces.

TEST EQUIPMENT: Three 18" Jones & Shipman production grinders were fitted with special spindles to enable wheels to operate at 5500 surface feet per minute, the speed generally used in diamond grinding.

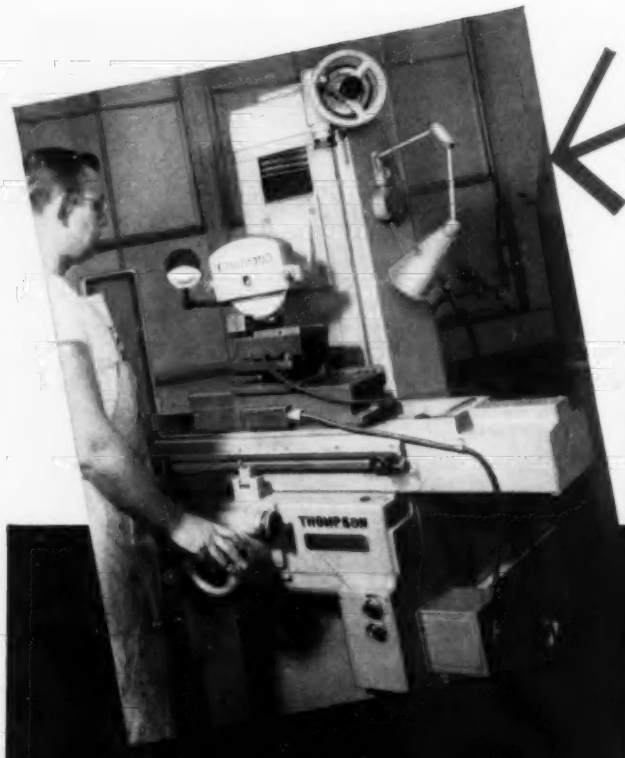
The wheels were of the D1A1 type, 6" in diameter, 3/16" face width, with 1/8" depth of resin. Each wheel contained 31 1/4 carats of the new grit. Metal to be ground was tungsten carbide of the same quality normally used for milling cutters, lathe tools, etc. During the course of the tests, 700 pounds of hardest carbide were ground away.

RESULTS: This new friable grit, Selected Natural Diamond (SND-RESINOID), increases the life of natural diamond resinoid wheels by 30% to 50%, depending on the type of job at hand. The grit will be available to your wheel manufacturer soon. Next time you order diamond resinoid wheels, specify SND-RESINOID . . . the most economical *and* the most efficient grit you can use.

Tests were run on these three Jones & Shipman production grinders. Results showed that the new grit, Selected Natural Diamond (SND-RESINOID), increases the life span of natural diamond resinoid wheels by 30% to 50%.

INDUSTRIAL DISTRIBUTORS (SALES), LTD.

YOU CAN DEPEND ON NATURAL DIAMONDS



Completely Satisfactory in Every Way

. . . says Mr. William H. Vogt, Division Superintendent of Parts and Tool Manufacturing at Taylor Instrument Companies, Rochester, N. Y.

NEW TYPE D Hand Feed SURFACE GRINDER

is ruggedly designed for precision work.

OFFICES IN ALL PRINCIPAL CITIES

Taylor Instrument Companies

for the home TEMPERATURE & WEATHER INSTRUMENTS *for industry* TEMPERATURE, PRESSURE, HUMIDITY, FLOW & LIQUID LEVEL INSTRUMENTS

SUBSIDIARIES IN TORONTO, CANADA LONDON, ENGLAND MELBOURNE, AUSTRALIA

95 AMES STREET
ROCHESTER 1, N.Y., U.S.A.
May 7, 1959

Mr. John C. Wilson,
Vice-President, Sales & Engineering
The Thompson Grinder Company
Springfield, Ohio

Subject: THOMPSON Type D Surface Grinder

Dear John:

We have proven the new Thompson Type D Tool Room Grinder by rigid tests in our Tool Grinding Department. We find it completely satisfactory in every way.

We find these decided advantages on the new Thompson:

1. Its ease of adjustment
2. Its ruggedness and rigidity
3. Its bedway and column protection
4. Its large vertical capacity
5. Its cross-feed movement obtained by moving the wheel head rather than using a saddle, which permits accurate grinding of slots.

Everything considered, we find, in our work, the new Thompson Type D a very superior precision machine.

Yours very truly,

William H. Vogt

William H. Vogt
Division Superintendent
Parts and Tool Manufacturing

whv:lb

With men like Mr. Vogt, who rate tool room grinders solely on their performance, Thompson's new Type D machine is winning enthusiastic approval.

Send for descriptive literature on this new Type D machine and compare the advantages it offers you in cost-cutting time-saving and trouble-free performance. Immediate delivery is available.

"Keep Thompson in mind for that daily grind"

Thompson SURFACE GRINDERS

THE THOMPSON GRINDER CO.

SPRINGFIELD, OHIO

Use postpaid card. Circle No. 208

Editor's Page

AUGUST 1959

EDITORIAL STAFF

William F. Schleicher
vice president and editorial director

Maurice M. Patterson
managing editor

Richard L. McKee
associate editor

M. Moffet
assistant editor

Vic Erickson
editorial art director

Arthur Rakestraw
contributing editor

BUSINESS STAFF

Robert C. Van Kampen
president

Vincent C. Hogren
executive vice president

J. E. Hitchcock
vice president

Oliver S. Pepper
business manager

John S. Todd
production manager

F. S. Larson
advertising production manager

Robert L. Spreckels
circulation manager

Gene West
fulfillment manager

Raymond J. Sietsema
director of research

Bruce B. Howat
marketing director

L. M. Schroeder
advertising art director

Relationship of Gaging

One thousandth of a mile is a little more than 5¼ feet and a millionth of a mile is .063 inches. But, have you stopped to realize that it is easier to hold a mile to thousandths than it is a 3 inch diameter. At the same time it is almost impossible to measure a mile to millionths and a 3 inch diameter is being measured to millionths every day. To take the comparison even further, 3 inch diameters are being gaged to ten thousandths of an inch at the rate of thousands per day while to measure a mile to this degree has rarely been required. The relative ability to obtain these accuracies is an indication of the advancement that has been made in gaging in answer to the demand.

Mass production has been the back bone of our industries development. For this reason gaging has developed in accordance to mass production. In-process gaging, pre-gaging, post-gaging, selective fitting, etc. have all resulted from the need for accuracy of mass produced parts. We are second to none in the development and manufacture of production gaging. But, just as we very seldom have the need to measure the mile to millionths, we had not felt the need to develop the ultra high precision gaging until the last war.

The effect of the war with the resulting development of rockets, missiles, nuclear equipment and other precision equipment has emphasized our lagging in this area of gaging. This is the area of ultra precision gaging of a relatively short number of parts. In the future we will be called upon to machine and gage to a fraction of a millionth. We should be prepared for this development and decrease the foreign edge in this area.

In order to supplement our development, we are starting a series in this issue on the how and why of gaging. These articles will provide basic information on all types of gaging involved in grinding. Grinding of course being the most precise metal removal operation.

One strong word of caution should be included in any discussion of gaging. As is the case with any process or method, gaging must be used with discretion. Even with the equipment and method available they should be used only after the need has been definitely established.

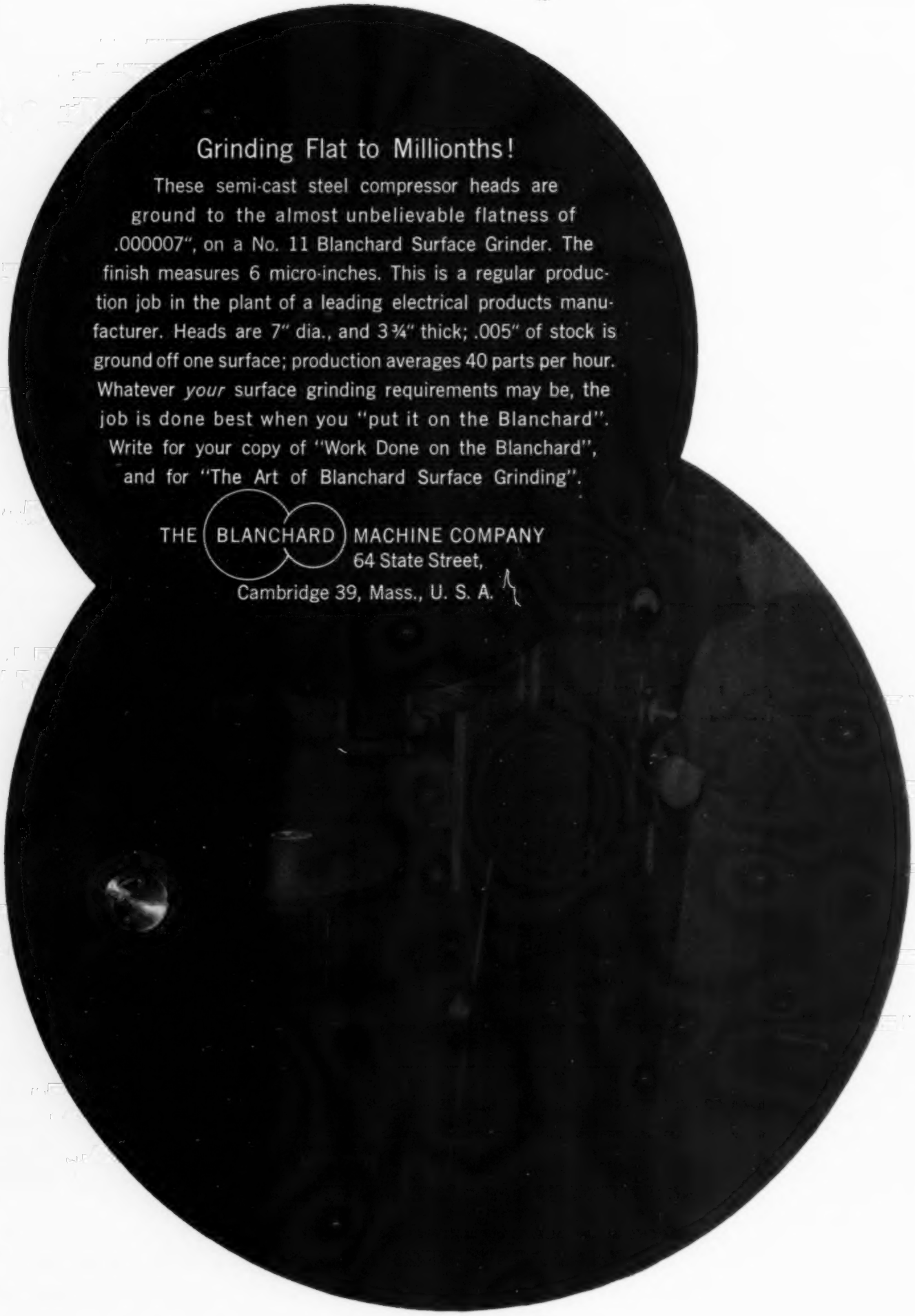
M. M. Patterson

Managing Editor

Grinding Flat to Millionths!

These semi-cast steel compressor heads are ground to the almost unbelievable flatness of .000007", on a No. 11 Blanchard Surface Grinder. The finish measures 6 micro-inches. This is a regular production job in the plant of a leading electrical products manufacturer. Heads are 7" dia., and 3¾" thick; .005" of stock is ground off one surface; production averages 40 parts per hour. Whatever *your* surface grinding requirements may be, the job is done best when you "put it on the Blanchard". Write for your copy of "Work Done on the Blanchard", and for "The Art of Blanchard Surface Grinding".

THE BLANCHARD MACHINE COMPANY
64 State Street,
Cambridge 39, Mass., U. S. A.



Use postpaid card Circle No. 209

RICHARD L. McKEE • Associate Editor

Timken's Eye Protection Program

● The eye protection program at The Timken Roller Bearing Company centers around a liberal system of providing fitted prescription and non-prescription safety glasses to all employees. It is a preventive program designed to encourage employees to protect their eyesight.

Display of styles of safety glasses available for Timken employees.

Results of the program have been dramatic. Since it was instituted nearly three years ago, there has been a 43% reduction in eye accident rates at the Canton plants.

In the grinding room, which is one of the largest in the world, there has been only one eye injury in the past two years.

Safety glasses, as shown by the nurse holding the display, are both attractive and comfortable. The non-flammable acetate frames come in copper and crystal pink colors in 16 different styles. Bifocal, double bifocal, and trifocal lenses can be ground to duplicate any prescription.

Employees obtain their prescription glasses by presenting their prescription to the medical department. Lenses are ground by an optical laboratory and the company's dispensing optician fits glasses to the employees. Plain safety glasses are fitted with the same care. No charge is made to the employee and if after six months he is still with the company, the prescription glasses are his.

Replacement and repair of pitted, scratched or broken glasses is assumed by the company. An inventory of spare frames and plain lenses is stocked to speed repairs. The replacement of prescription glasses takes about a week's time. • • •

(Editor's note: While the Timken program described above does not bear specifically on grinding safety, it is considered applicable because any plan which encourages the wearing of safety glasses is a step in the direction of grinding safely. Our thanks to Robert Wagner, Timken's manager of public relations, for the write-up and the photo.)

BIG WHEEL?

RIGHT!

It's a 5-foot Segment Chuck with FM Segments!

Your chuck may not be 5 feet in diameter... but FM makes segments for *all* of the popular chucks from 6″ to 60″.

The manufacture and application of segments is our business. If the use of segments is *yours*, let's get together . . . soon!

VITRIFIED and RESINOID GRINDING WHEELS and SEGMENTS

For prompt delivery . . .
for expert field service . . . call us!
A guide to wheel selection available on request.

THE
FULLER MERRIAM CO.
Water St. West Haven, Conn.
Telephone WEst 3-2501

Use postpaid card. Circle No. 210

Metalworking in General

Timken Constructs Plant in France

Construction of The Timken Roller Bearing Co.'s bearing production plant at Colmar, France got underway. Two buildings, a parking lot and a steel storage area are expected to be completed within this year. The new buildings will provide more than 60,000 sq. ft. of floor space. About 200 people will be employed at the new plant when the first phase is completed. This is in addition to the 1,000 employed at the Timken Co.'s plant in Asnieres, a suburb of Paris. Investment in ground, buildings and equipment is estimated in excess of $3,400,000.

Kaiser Aluminum Dome to House American Exhibit in Moscow

This completed Kaiser Aluminum dome will be the focal point of the American National Exhibition in Sokolniki Park, Moscow, August 2 through September 13. The cultural and industrial exhibition will display the American way of life to the Russian people. The 200′ diameter gold anodized structure is the largest geodesic dome yet to be built anywhere. It has attracted widespread Russian interest, including a personal visit by Premier Nikita S. Khrushchev.

U.S. Machine Tool Industry Fights Foreign Competition

The U.S. machine tool industry is being pinched by foreign competition. But, says **Business Week,** the industry is alert to the problems and is starting a counterattack of its own.

This defense measure is being accomplished by U.S. machine tool makers moving to Europe to gain back their dwindling foreign markets. On the home front, they are cutting costs to meet lower foreign prices, redesigning machines, and putting more emphasis on U.S. made products.

GM's Automatic Highway Unveiled in Scale Model

Shown to about 350 newsmen and highway experts, GM's Auto-Control System takes over steering, speed control and obstacle detection. The system shown was a 1/40th scale model simulating a four-lane divided highway. Four miniature buses, controlled by electrical signals from the road, roll around the 20'x30' oval highway at either of two predetermined speeds that are equivalent to 30 and 60 mph on a full-size highway. All electronic units in the 11" long buses are full scale, as well as the master control units.

"Auto-Control was built to stimulate both highway and automotive research interest in an automatic highway concept," declared Dr. Lawrence R. Hafstad, Vice-President in charge of GM Research Laboratories. "It represents one workable approach to a very complex problem."

Quality Control Standards Approved By ASA

Three basic quality control standards newly brought up to date have been approved as American Standards by the American Standards Association. Formerly American War Standards, they are "Guide for Quality Control," Z1.1-1958; "Control Chart Method of Analyzing Data," Z1.2-1958, and "Control Chart Method of Controlling Quality During Production," Z1.3-1958.

Copies may be obtained from the American Standards Association, Dept. PR 72, 70 E. 45th St., New York 17, N. Y. Z1.1-1958 and Z1.2-1958 are combined in one publication and cost $2.25, and Z1.3-1958 costs $2.50.

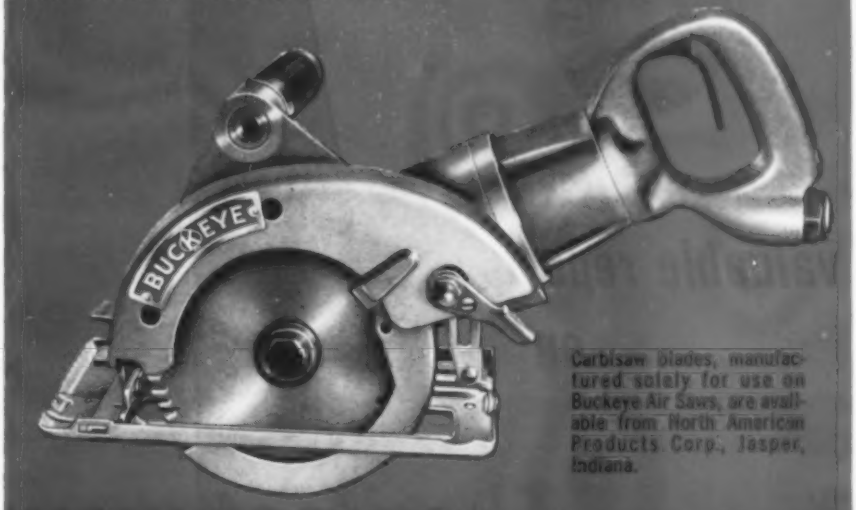
Production Engineering Show, Machine Tool Exposition Scheduled for Sept. 6-16, 1960

The Production Engineering Show, last held in 1955 concurrently with the Machine Tool Exposition, is scheduled for Navy Pier, Chicago, Sept. 6-16, 1960. The Machine Tool Exposition, sponsored by the National Machine Tool Builders Association, will be held at the International Amphitheatre on the same dates. More than 125,000 production executives from every country of the world are expected.

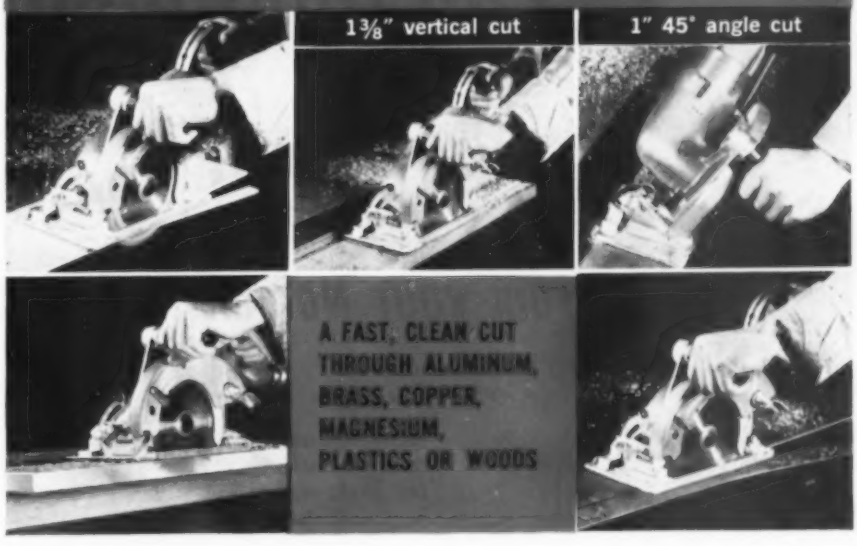
Exhibits at the Machine Tool Exposition are limited to company members of the association who are producers of prime machine tools. The Production Engineering Show will be the only exhibit of products which support prime production tools.

the most useful SAW you'll ever see!

BUILT TO U. S. NAVY REQUIREMENTS by BUCKEYE



Carbisaw blades, manufactured solely for use on Buckeye Air Saws, are available from North American Products Corp., Jasper, Indiana.



Just squeeze the safety throttle and this portable saw starts cutting—right now! Powerful, governed Buckeye air motor is geared to produce the torque needed for a fast, sharp cut, even on non-ferrous materials. No backups to allow saw to regain speed, and no burnouts from overloads. Lightweight—16½ pounds—perfectly balanced for ease of handling. ⅝" arbor accommodates blades for fine, medium and heavy duty work.

WRITE FOR CATALOG

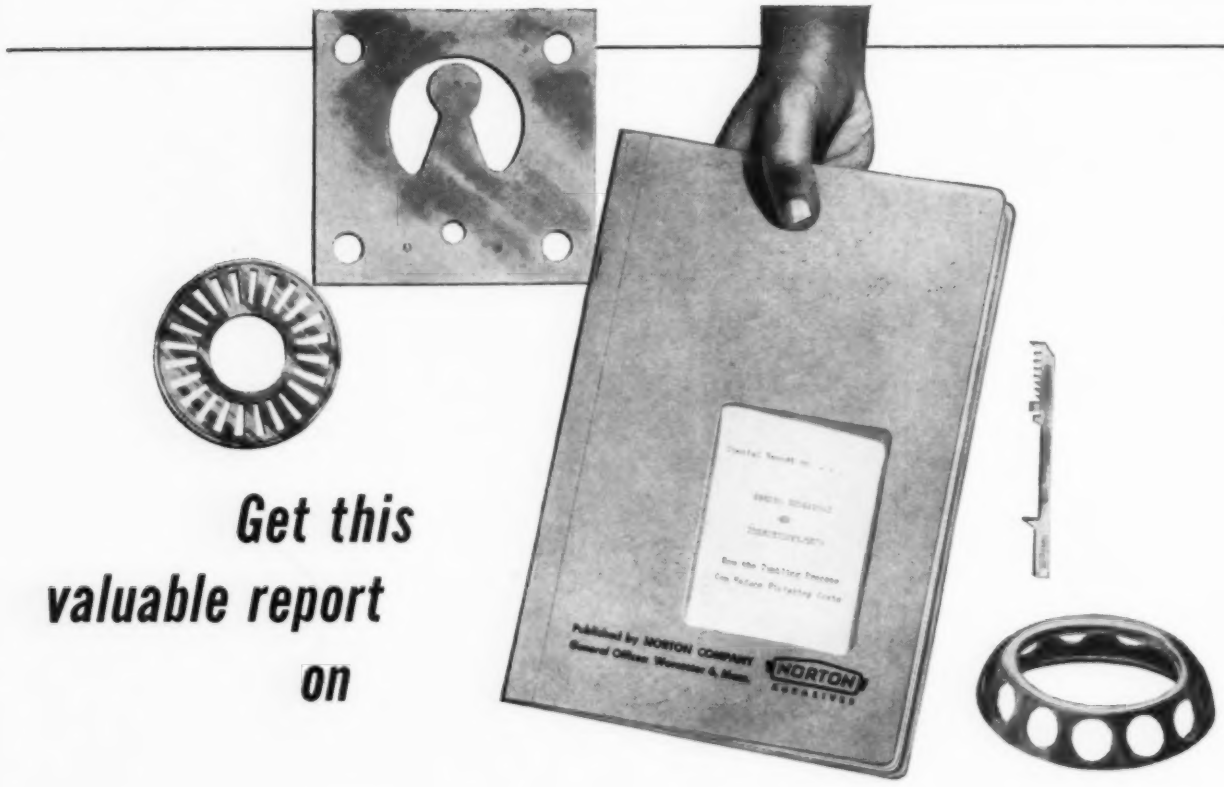
Write, on your company letterhead please, for your free copy of Catalog G-10, listing all Buckeye air tools—drilling, fastening, abrasive and specials.

INDUSTRIAL AIR TOOLS SINCE 1920

Buckeye Tools CORPORATION

5018 SPRINGBORO PIKE, DAYTON, OHIO

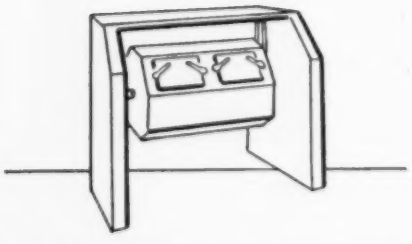
Use postpaid card. Circle No. 211



Get this valuable report on

The best ways to finish metal stampings

from your Norton Representative



Newest in the Norton series of reports to industry is *Barrel-Finishing of Metal Stampings*, prepared by Norton engineers.

Based on continual observation of finishing techniques in many plants, this report brings you plenty of worthwhile information on the advantages of barrel-finishing equipment and abrasives. Included are facts on improving fatigue resistance of metal stampings . . . types and sizes of stampings you can barrel-finish . . . and reports like the following:

Cylindrical, steel-cage stampings had many slots with burrs on edge of each slot. Requirements were: removal of burrs, forming slight radii on all edges, improving surface finish. A large finishing barrel was charged with random-shaped ALUNDUM* TUMBLEX* *"A" abrasive chips in a water solution level with the top of the mass. All operations were completed in one run and thousands of parts were barrel-finished in one day.*

Aircraft panel stampings, 12" square x 1/8" thick, perforated, were processed by placing 12 panels 1" apart, using steel rods with fiber bushings as spacers. This whole unit was placed in the barrel, where bonded, triangular-shaped ALUNDUM TUMBLEX *"T" chips successfully removed all burrs from the stampings' edges and perforations.*

Your Norton Representative can supply you with this report fast — will also provide literature on all TUMBLEX abrasive types: "A" (random-shaped chips), "T" (bonded triangles), "S" (bonded spheres), and "N" (natural stones), covering the widest range of finishing requirements. And samples of your work parts sent to our Sample Processing Department will be promptly barrel-finished and returned to you with complete facts as to abrasives, methods and equipment. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world. G-371

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electro-Chemicals — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Use postpcid card. Circle No. 212

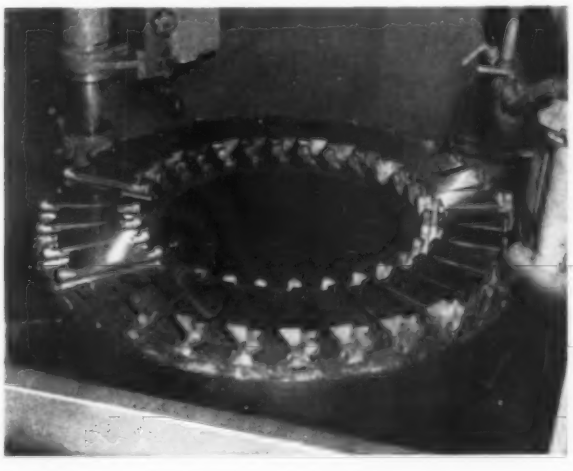
Change from Milling to Grinding Saves 22¢ per Piece

● Formerly these 4140 drop-forged chain links were milled, 100 pieces every three hours, using high-speed steel cutters. Eighteen pieces were produced between sharpenings.

At 35 minutes per sharpening, 3.2 hours of cutter maintenance were required for every three hours production at a labor cost of $16. This plus a machining cost of 15c per piece resulted in a total cost of 31c each.

Today these links are machined in 20-piece loads at a rate of 100 pieces per hour on a Mattison Vertical Spindle Surface Grinder. Stock removal is .140 in., at .016 in. minimum downfeed per minute. Wheel cost per piece is 4c, but maintenance cost is eliminated because the wheel is self-dressing. Including a labor and machine cost of 5c per piece, the total cost to grind is only 9c, a direct saving of 22c per piece, not including added savings in the cost of cutters.

Under the old method, the time for maintaining cutters exceeded production time. Under the new, this maintenance time has been eliminated. • • •

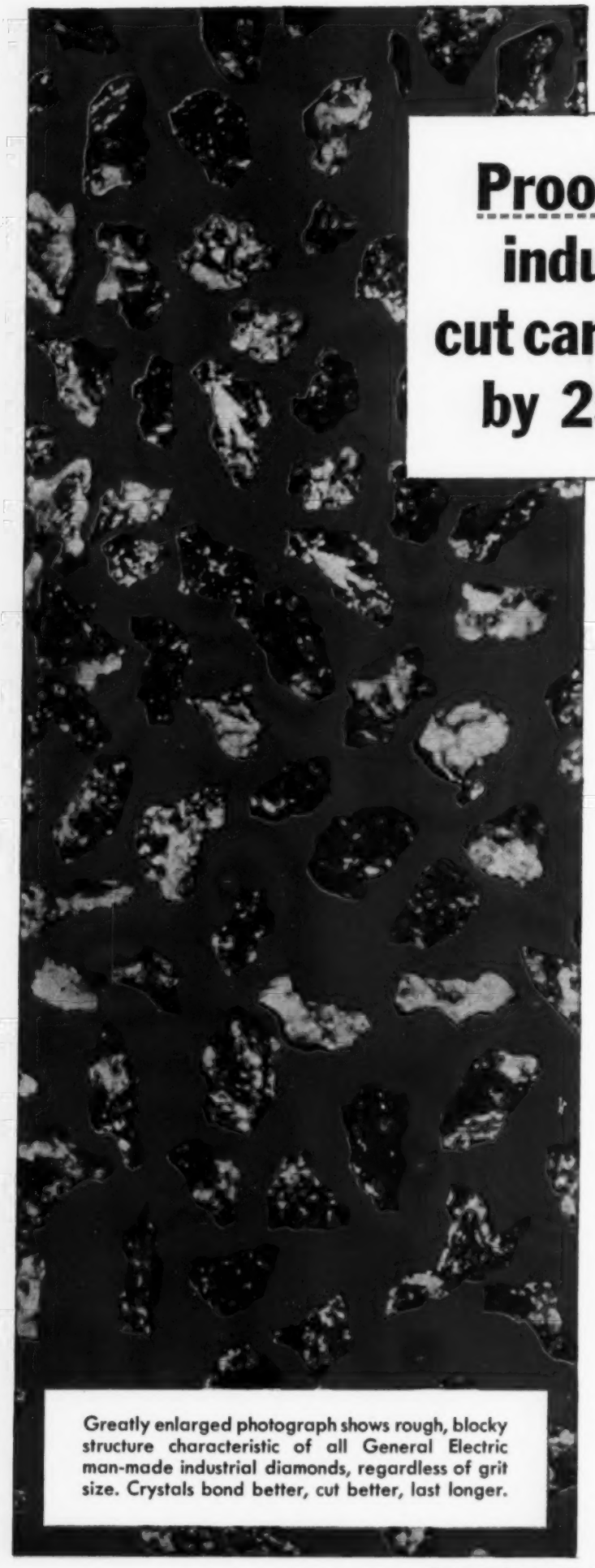


Close-up of chain links mounted for grinding. Automatic sizer gages parts continuously and stops grinding cycle when finished size is reached.

Change from milling to grinding tripled production, cut costs approximately 70%, eliminated cutter maintenance time.

Metallurgical Memo from General Electric

Proof! G-E man-made industrial diamonds cut carbide grinding costs by 25%-35% average



Greatly enlarged photograph shows rough, blocky structure characteristic of all General Electric man-made industrial diamonds, regardless of grit size. Crystals bond better, cut better, last longer.

Diamond wheel users report on significant savings in switch from natural to man-made diamond wheels Here are some examples:

Automotive Manufacturer, cutter grinding: 5" x 1¾" x 1¼" flaring cup wheels, resinoid bond, 100 concentration, 100 grit—dry grinding. Man-made diamond wheel produced 1217 cutters and still had one-third of the wheel left. Natural diamond wheel produced only 696 cutters per wheel.

Power Tool Company, carbide burr grinding: 6" x ⅛" x 1¼" straight wheels, resinoid bond, 100 concentration, 180 grit—dry grinding. Wheel life with G-E man-made diamonds was 48 hours, while that of the natural diamond wheel was only 34 hours.

Saw Manufacturer, sharpening carbide knives and saws: 3¾" x 1½" x 1¼" flaring cup wheels, resinoid bond, 100 concentration, 120 grit—wet grinding with Cincinnati tool and cutter grinder. Man-made diamond wheel removed 70% more carbide with 57% less wheel wear.

Laminated Die Manufacturer, internal grinding of carbide dies: 1½" x ¼" x ¼" straight wheels, resinoid bond, 100 concentration, 320 grit. Wheel with General Electric man-made diamonds cut faster with longer life than natural diamond wheel.

General Electric man-made industrial diamonds can make savings like those above possible in *your* plant. Specify them from your wheel manufacturers. *Metallurgical Products Department of General Electric Company, 11177 E. 8 Mile Street, Detroit 32, Mich.*

METALLURGICAL PRODUCTS DEPARTMENT

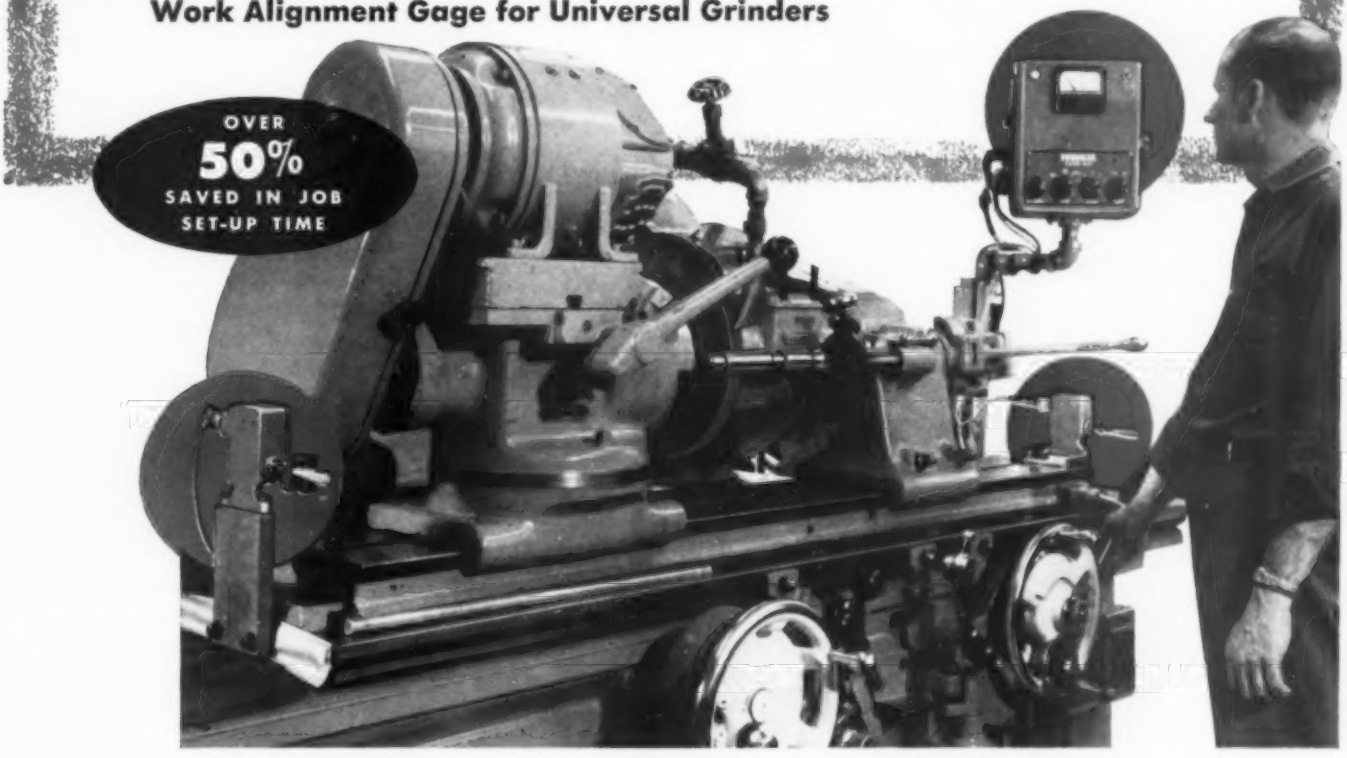
GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES
MAN-MADE DIAMONDS • VACUUM-MELTED ALLOYS
THERMISTORS • MAGNETIC MATERIALS • THYRITE®

Use postpaid card. Circle No. 213

the Sure-set FAST ACCURATE ABSOLUTE

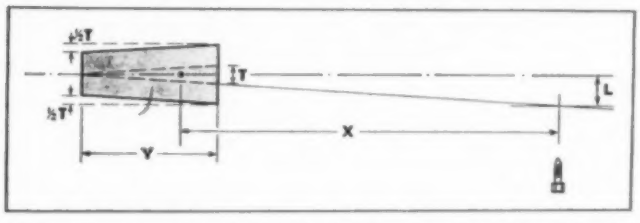
Work Alignment Gage for Universal Grinders



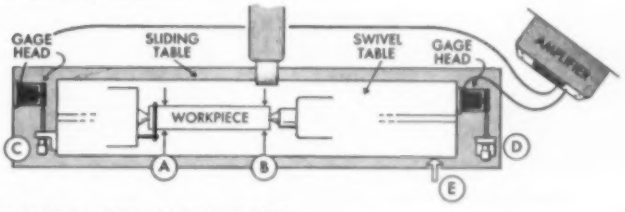
HOW THE SURE-SET PROVIDES *ABSOLUTE* CONTROL OVER WORK POSITIONING

(1) The Sure-Set is an electronic work-positioning gage which guides the operator in making the *exact amount* of swivel table adjustment needed to eliminate unwanted taper or — conversely — to produce a specifically desired taper, so that a part can be produced successfully *WITH ONLY ONE TRIAL CUT*. There is no restriction on workpiece length or table length.

(2) The Sure-Set shows the operator when he has made the table adjustment correctly by showing actual table position. And, because it shows how much *each end* of the table moves, the operator can make correct adjustment, EVEN THOUGH THERE IS PIVOT LOOSENESS, STICK-SLIP, OR ACTUAL BENDING OF THE TABLE . . . conditions which occur in MOST grinders.



(3) The Sure-Set electronically compensates for the difference between length of workpiece (Y) and the distance from table pivot to adjusting screw (X). This is important because it permits the operator to make the correct table adjustment (L) without first having to stop and calculate what it actually should be. The Sure-Set is able to save the operator this calculation by charts, graphs, and mathematics because its meter (graduated in .001" or .0001") reads in terms of the workpiece taper (T) which he already knows.



A HARD JOB MADE EASY

The Sure-Set saves over 50% set-up time by eliminating trial-and-error grinding and repeated checks. Here is the procedure: Take trial cut . . . gage work at two points (A and B) to determine taper . . . set compensating switch on Sure-Set amplifier to match distance between A and B points . . . watching meter on amplifier, zero each gage head by adjustments at C and D . . . adjust swivel table at E until meter reading for *each* gage head matches the amount of taper . . . TAKE FINISH CUT. Total elapsed time — 2 to 3 minutes!

You'll be amazed how much time and money the Sure-Set can save! For further information contact your local FEDERAL representative or write . . .

FEDERAL PRODUCTS CORPORATION
9448 Eddy Street, Providence 1, R. I.

Ask **FEDERAL** *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

Use postpaid card. Circle No. 214

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO for Better Values

With this Campbell Machine, you can--

Cut 6-inch Diameter Hard Alloys-Cleanly and Accurately-in Less Than 3 Minutes!

• This Campbell wet abrasive cutting machine—the Model 406—will cut tubing, bar stock, angle iron, or any other shape up to 6″ round or square—and it will cut practically *any* material, including the new super alloys and exotic metals. Like all Campbell machines, it's designed to give *accurate* cuts, quickly and cleanly.

HIGH SPEED—4 to 8 seconds per square inch is the normal cutting speed for all Campbell wet abrasive cutting machines. For instance, you can cut 6″ diameter hardened steel in less than 3 minutes.

ACCURACY—Campbell machines are production machine tools. They cut within close tolerances to reduce rejects and scrap loss. For example, the Model 406 will cut 3″ diameter material to lengths within ±.010″, 6″ diameter within ±.030″.

FINE FINISH—Additional finishing operations are rarely required. There is no burn, and burr has been reduced to an absolute minimum.

POWER OSCILLATION—On an oscillating-type machine such as the Model 406, the cutting wheel is moved horizontally back and forth *across* the cut as the wheel is fed downward. The result—greater cutting capacity, with longer wheel life.

PROPER COOLANT APPLICATION—Large reservoir and a 33 gallon/minute pump provide high volume of coolant. Unique Campbell distributor applies coolant equally to both sides of the wheel—an essential requirement for accurate cuts.

OTHER CAMPBELL MACHINES FOR ANY CUT-OFF NEED

Choose from four types of Campbell machines for wet or dry cutting—chop stroke, oscillating, horizontal or rotary—with capacities up to 14″ rounds, 12″ billets, plate up to 6″ thick and 20 ft. long.

Regardless of your application, you'll find that a Campbell machine provides you with the best cut-off method for modern production techniques—far more efficient, accurate and economical for cutting many materials than other cutting equipment.

WRITE FOR DETAILS—Bulletin DH-260 gives the complete story on the Campbell Model 406 abrasive cutting machine. We'll also be glad to send you information on other machines; just tell us your cut-off application. And remember—your Allison-Campbell Field Engineer is an abrasive cutting specialist. Call on him for expert advice.

ACCO TRADE MARK

CAMPBELL ABRASIVE CUTTING MACHINES

Allison-Campbell Division • American Chain & Cable Company, Inc.

926 Connecticut Avenue, Bridgeport 2, Conn.

Use postpaid card. Circle No. 215

You Asked . . .

ARTHUR RAKESTRAW

Contributing Editor

Speeds and Feeds for Resinoid Cut-Off Wheels

● Why is it considered better practice to run resinoid cut-off wheels at a rapid rate—up to 16,000 sfpm—and to feed the wheel into the work as rapidly as possible?—D. M. Youngstown, Ohio.

Resinoid cut-off wheels which have been designed and tested for operation at 16,000 sfpm would be capable of production rates considerably above that of wheels operating at 9,500 sfpm. Because of the increase in rate of cut, more rapid infeeds would be necessary to insure that the wheel would maintain contact with the work. Too slow a

feed would result in a glazing of the wheel face and resulting burn or possible run-out.

Whether or not these high operating speeds are considered better practice, we would suggest that extreme caution be exercised in pursuing this assumption. By far the greater volume of resinoid cut-off wheels are still operated at much lower speeds. Do not operate any cut-off wheels at speeds in excess of that for which they have been designed and tested. Do not assume that all cut-off wheels can be operated at 16,000 sfpm unless such speed has been checked and recommended by the manufacturer.

Widths of Wheels for Cylindrical Grinding

• I have heard it said that you should use the widest possible wheel on cylindrical grinding operations? Why is this?—L. L. Detroit.

The statement as given might suggest two different conditions: i.e. (A) the widest possible wheel that could be assembled on the wheel mount, or (B) the widest wheel that could be satisfactorily used on the particular operation.

(A) On long work pieces, where the surface to be ground is considerably greater than the wheel width, a traverse grind would be used. On shorter work lengths, the surface might be covered by a series of plunge cuts and a final traverse cut. In either case, the greatest possible wheel width would be desirable in reducing the time required to cover the work surface.

(B) The second condition might involve grinding operations where because of the possibility of part deflection resulting from the increased pressure of wide wheels it would be desirable to reduce the wheel width. There are also some operations where it is desirable to use narrower wheel widths and an oscillating spindle to cover the cylindrical surface in order to improve the rate of stock removal.

In general, the greater the amount of wheel abrasive in contact with the work surface, the less the time required to remove stock. Hence the preference for wider wheels.

Causes of Tapering in Centerless Grinding

● We have had some trouble with tapering of wrist pins ground on a centerless grinder. Sometimes this comes on the front end of the piece, sometimes on the rear end and occasionally on both ends. What might be causing this? —C. W. Chicago.

From the description of your difficulties and the fact that taper occurs at either end or both ends of the wrist pins, we suggest that you carefully check the work guides.

Taper on the front end of the pin usually results when the work guides on the entrance side are adjusted too close to the regulating wheel. Taper on the rear end of the pin likewise may result when the work guides on the exit side are adjusted too close to the regulating wheel. A combination of the above conditions would taper both ends.

We would suggest that you double-check the adjustment of the work guides and make sure that this adjustment does not change during grinding.

What's YOUR Grinding Problem?

Whatever it is, whether a bothersome detail or a basic idea, ask "Rake" Rakestraw, and out of his years of experience and wide acquaintanceship in the abrasive industry, he'll answer it for you. Use the READER SERVICE CARD. If your question is too long for one of the blanks, put it on a separate piece of paper and paste or staple it to the card.

The Royal Cubit, made of black granite, was ancient Egypt's master standard against which all "working cubits" were calibrated (Photograph courtesy the DoAll Company)

(Below) An assortment of flush pin, special snap gages, concentricity and depth plugs, flat gages, ring gages and profile gages. (Photograph courtesy Size Control Company)

Number 1 of a Series

Most of today's precision finishing is accomplished by some abrasive operation—grinding, honing, barrel finishing, lapping, abrasive belts. Gaging is the means of determining when the required precision has been attained. This article covers the bench marks for the selection of gages.

The How and Why of Gaging

By RICHARD L. McKEE
Associate Editor

● Talk of grinding to millionths is bandied about so casually today that there is danger of losing sight of the fact that many shops experience difficulty in holding tolerances in "tenths." Yet at the same time, this approach symbolizes the tremendous strides that have recently been made in precision. It has been little more than a hundred years ago that the measure of precision was a visible fraction of an inch. In World War I the hallmark of precision was a thousandth of an inch; in the Second World War it became a "tenth"; today it is a millionth and there is serious consideration of still finer tolerances.

Teamed together in this progress in precision have been gaging and some form of abrasive operation—grinding, honing or lapping, for examples. In effect, the abrasive operation is the means of securing the precision, and the gaging indicates that it has or has not been achieved.

So rapidly have the developments come, indeed, that there appears to be a need for a review of the fundamentals of gaging as a frame of reference for people who are not constantly in touch with the field, and to provide a basis for objective consideration of new developments.

This is the first of a group of articles to be devoted to the subject of gaging. The underlying thought of the series is that while there are several different gages that might do a passable job on an application, there is one best gage. In addition, it is felt that a better understanding of the objectives of gaging and the advantages and limitations of the various types will be helpful to all users.

What is gaging?

Gaging is a form of dimensional control. While it is a form of measurement, the results are usually stated in relationship to a specified variation from theoretically exact dimensions rather than in any unit of measurement. The variation, or tolerance, may extend on both sides of the basic size, or it may be limited to one side or the other.

The essentials of gaging are these: a means of contacting the workpiece, a means of showing how the piece dimension compares with a specified dimension, periodic checks of the instruments against a master standard and correction of the process when the product gets too far out of line.

These concepts are by no means new. It is recorded that the ancient Egyptians, cutting stones for the Pyramids in quarries at some distance from the final sites, used measuring sticks at the quarries. The sticks had to be brought in periodically for checking against a black granite master, and the penalty for failing to do so was heavy. It is a tribute to this kind of care that many of the stones used in the Pyramids are accurate to within a sixty-fourth of an inch.

Today the simple measuring sticks of the Egyptians have become a bewildering variety of devices ranging from simple plug and ring gages to set-ups that will accurately check a number of dimensions as fast as the pieces can be produced—and then make corrections to enable the machine to stay within established tolerances. The contacts may be mechanical or pneumatic; the signals may be amplified mechanically, electrically or electronically. Light rays or sound waves may be used, in optical or ultrasonic gaging.

In short, there are gages available today to check practically any dimension. The problem, then, is to find the set-up that will meet the requirements of accuracy at the lowest cost. But it is only after the first requirement is satisfied that the cost factor should enter. A manufacturer who selected his gages on the basis of cost alone could find himself with a bunch of scrap parts if his gages were not accurate enough. On the other hand, it is possible to have a more elaborate and expensive set-up that can be justified, and that causes losses, too.

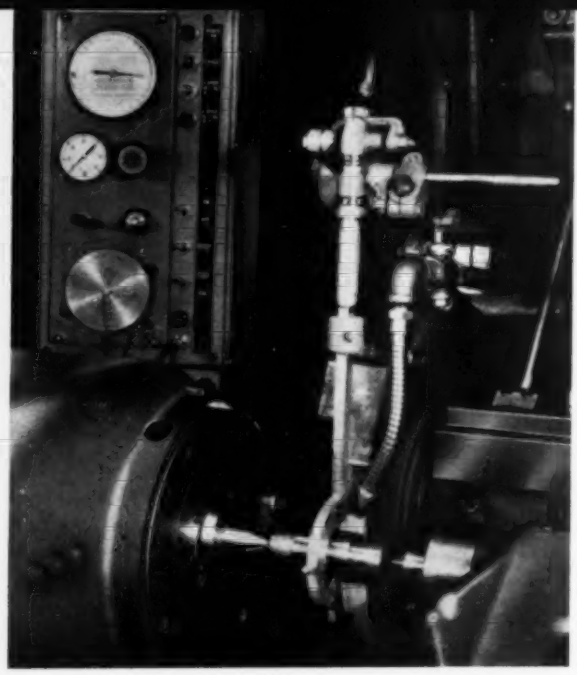
In other words, it doesn't pay to hunt elephants wih a .22 rifle any more than it does to hunt sparrows with an elephant gun.

Basic Considerations in Gaging

Any review of the possibilities and limitations of gaging must take into account certain fundamentals. These stem primarily from the fact that there is no such thing in industrial production as an absolute inch (1.000000"), or indeed, an absolute measurement in any unit. Nor is there a machine available that will produce absolute and exact duplicates.

It is true that we are approaching the absolutes more closely than would have been thought possible even a few years ago, but even under the best of conditions it is still necessary to work to some kind of range rather than to absolute dimensions.

For one reason, every machine must be constructed with a certain amount of clearance for the working parts, or otherwise it cannot operate. The clearance,



This caliper gage transmits electrical signals which actuate changes in feed rate, cause infeed to stop for "sparkout" and retract the wheel slide when work part reaches finished size. It utilizes a Sheffield "Plunjet" cartridge which is connected pneumatically with "Modulaire" or "Lectrolair" units. (Photograph courtesy The Sheffield Corporation)

however, allows a small amount of "play" and means that the machine cannot produce exact duplicates.

For a second reason, there is always wear in both the machine and the tools every time they are used. It is true that this is an infinitesimal amount per pass, but it is there and must be considered. And it is a factor in preventing exact duplication.

If the acceptable limits of a particular dimension can be regarded as a horizontal band with the basic dimension as a line through the middle, then the differences in that dimension for a succession of part-pieces would show up as a series of dots scattered across the band. Variations resulting from play in the machine would show up as random dots above and below the line of the basic dimension. The wear factor, however, would tend to pull the pattern of dots toward one extreme or the other.

The material out of which the product is made is another factor hindering exact duplication. Most metals are commonly regarded as solids, and as such, stable in their dimensions. In the shadowland of millionths, however, they take on quite different characteristics. They "grow" with even slight increases in temperature. The body heat of an operator, for instance, would be sufficient to change the thickness of a piece of steel by several millionths of an inch. A gage block held in a person's hand for even a few minutes would expand enough so as to be useless for exact measurement for several hours.

They shrink as the temperature drops. They absorb moisture from the air. They can be compressed with less pressure than one might imagine. A four-inch Hoke gage block, for instance, can be compressed several millionths of an inch simply by tightening an inserted tie-rod with a screwdriver turned by hand.

But if these factors make exact duplication impossible, duplication to required tolerances definitely is—as being demonstrated every day in plants all over the country. As one man has put it, "If you can make it, you can gage it." Gaging controls the dimensional uniformity of the product within the specified limits, and hence the selection of proper gages is of importance to every user.

Selection of Gages

The selection of a specific gage or a specific combination of gages for an application is much too detailed a process to be covered adequately in a general article. This requires considerable knowledge of available equipment and more than a passing acquaintance with the process involved. It is hoped, however, that in this and succeeding articles of the series, enough information can be presented to enable users to do a better job analyzing their requirements and discussing them with manufacturers' representatives. And in that connection, these "reps" are excellent sources of information, particularly on new developments.

Below are listed some of the main points to be studied in relation to the selection of gages:

1. How much precision is required?

This is really the fundamental question, on which everything else depends. It is true that precision approaching the ultimate is possible, but it is also expensive, in terms of all the other factors of manufacturing as well as in gaging. Working to greater pre-

Typical arrangement for checking size, out-of-roundness and taper of workpiece. One graduation on the scale equals 10 millionths of an inch. (Photograph courtesy of Brown & Sharpe Mfg. Company)

cision than is required can be as costly as failing to meet the specified tolerances.

2. What is the rate of production?

The type of gage that would be suitable for a slow rate of production would probably not be fast enough for a higher rate, and vice versa. A gage that would be suitable for a maintenance machinist, where output was not so pressing a problem, would probably not be desirable on a production operation.

3. What is the value of the production?

Normally volume rather than unit cost is a controlling factor, but there are situations where the value is such as to justify elaborate gaging.

4. How many critical dimensions must be checked?

Obviously, the greater the number of critical dimensions, the more elaborate the gaging set-up and the greater the number of gages.

5. What percentage of the production is to be gaged?

Determining the percentage is a matter of quality control, and consequently somewhat out of the range of this discussion. But once this has been determined, it bears directly on gage selection. If this is to be 100% on a high-volume job, then the gage would probably have to be completely automatic, matching the production rate of the machine. On the other hand, if only 5% of the production needs to be gaged, a less automatic installation could well be adequate. It is a truism of the industry that as gaging becomes more automatic, more precision is built into the instrument and less is required of the operator.

6. How flexible is the equipment?

This is a consideration that is probably more significant for production on a job-shop basis than it is on high-volume production. However, the variety of uses to which a proposed set-up may be put is a matter to be taken into account.

7. Where will the gaging be done?

A gage which produces excellent results in a laboratory might very well be inadequate under production line conditions. In general, in-process gages must be sturdier and better-protected against moisture and other adverse conditions than post-process gages.

8. How stable is the gage?

Will it hold its original size and tolerance for an appreciable period of time?

9. Is the gage sturdily constructed?

How much maintenance is it likely to need—and if so, can the repairs or replacements be made by company mechanics, or must service men be called from the maker? Are the parts which are most likely to need replacement units for which spares can be stocked, or will they require that the gage—and consequently the machine on which it is installed—be shut down for repair?

10. How complete is the instrument?

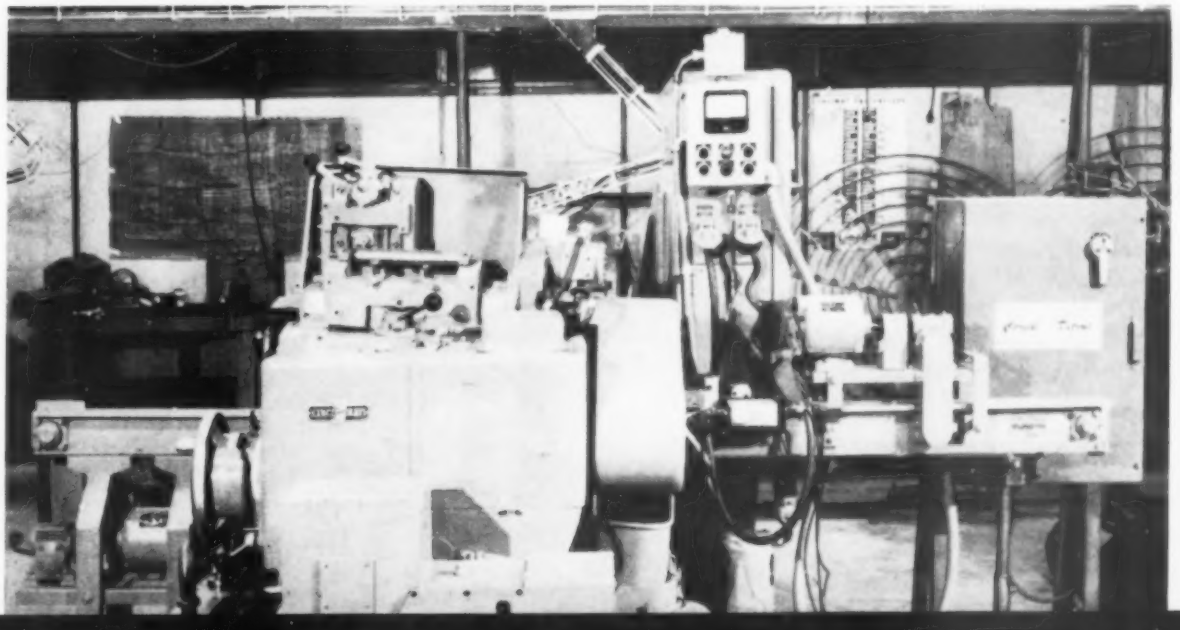
Is it, for instance, manufactured completely by one manufacturer, who can be contacted for replacement parts and service? Or has it been assembled from the products of several makers? The second situation is not necessarily better or worse than the first. There are in the field a number of companies that specialize in one type of instrument rather than making all kinds of gages, and whose products are quite compatible with units from other companies. The important point to be ascertained is, of course, whether replacements can be secured from the vendor, or whether the original manufacturer must be contacted.

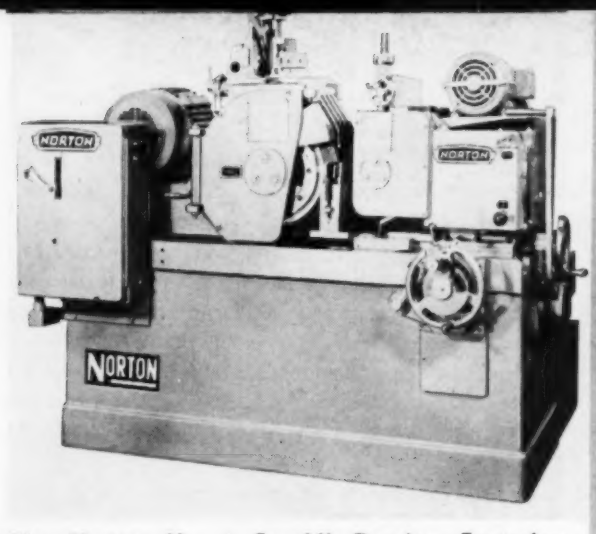
The above is not intended to be a complete discussion of the various kind of gages. As each of the broad types is covered in future articles, its advantages and limitations in relation to the above points will be more fully explored. • • •

(Acknowledgment is made to Messrs. Ernest E. Olds, vice president, and Frank J. Vlasaty, Size Control Company, for review of the above material.)

(Editor's Note: Three of the future articles in this series will deal with such subjects as gage blocks; direct-reading gages such as ring, snap and plug gages; dial indicators; air gages; electric and electronic gaging; optical gaging; and sonic gaging. The concluding article will discuss current problems and the outlook for the future, as seen by leaders in the field.)

Cargill Detroit Continuous Size Control on Cincinnati No. 2 centerless grinder. The size control continually compensates the grinder for all trend conditions such as wheel wear, thermal conditions, processing. (Photograph courtesy Cargill Detroit Corporation)





The Norton No. 2 Straddle-Bearing Centerless Grinder

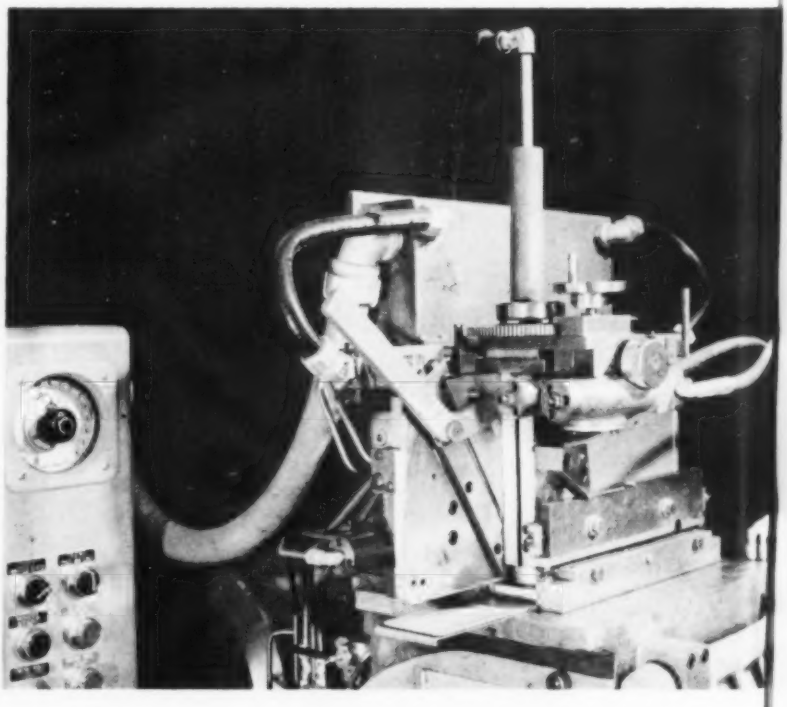
Straddle-Bearings Provided in New Centerless Grinder

● Emphasizing rigidity and ruggedness, the Norton Company introduced its Straddle-Bearing Centerless Grinder Model No. 2. The incorporation of the straddle-bearing spindle for both the grinding wheel and regulating wheel has in no way complicated the mounting of these wheels. Other outstanding features of this centerless grinder are the dual mobile wheel heads which ride on friction ways, work rest mounted on the sub-base of the regulating wheel, wheel head adjustment in increments of .00005 inches, direct reading hand feed, quick selection for regulating wheel speeds for grinding and truing, and grinding wheel truing hydraulically powered, which permits truing of a 90° step in the wheel without special equipment.

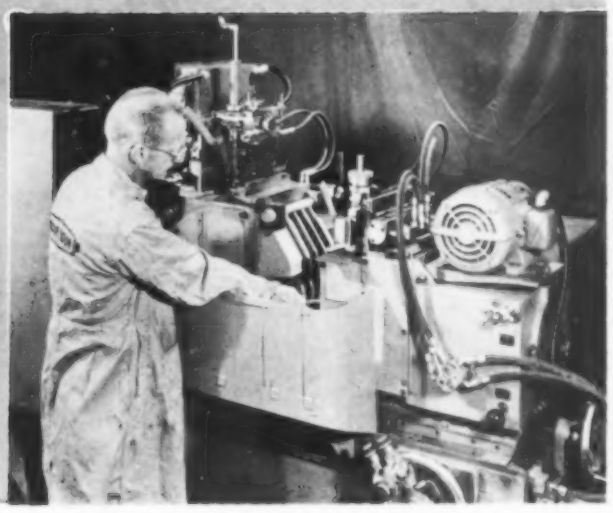
The capacity of the new No. 2 centerless grinder, which can be arranged for full automatic, semi-automatic, or manual thru-feed or plunge grinding, is 1/16" to 4¾", depending on the type of work rest and bar grinding fixture. The grinding wheel sizes are up to 8" in width with the 12" hole, 20" maximum and 14" minimum diameters. The regulating wheel also ranges up to 8" in width, with a 5" hole, 12" maximum and 8½" minimum diameters. The regulating wheel speeds are infinite between 8 and 66 r.p.m. for grinding, and constant at 310 r.p.m. for truing which is independent of the grinding speeds. Grinding wheel drive is provided by a 15 h.p. totally enclosed ball bearing motor utilizing a fine feed belt drive. Regulating wheel drive is provided by 1½ h.p. totally enclosed ball bearing motor utilizing v-belt transmission with variable pitch sheaves. Floor space is 96" by 66".

The straddle-bearing design is an outstanding example of the rigidity that is built into this machine. Both the grinding wheel and the regulating wheel are supported on either side by anti-friction bearings to minimize the tendency for the spindles to flex from the weight of the wheel or from grinding pressure. This also permits heavier grinding pressures than can be used with unsupported spindles. The increased support also provides for consistent sizing on thru-feed grinding operations, less truing, and better sizing in plunge feed grinding. Reduction in vibration and flexing increases the control of finish.

The unique design of the wheel cover guards which are hinged provide for quick changing of the grinding wheel and regulating wheel. The wheel guard covers support the outboard spindle bearings which are mounted in the center of the cover. These covers are provided with the small hinged snap doors to permit



Hydraulically power grinding wheel truing device, for straight or contour dressing. This device is capable of truing 90° angle with no extra equipment.



Dual mobile wheel heads ride on friction ways with wheel head adjustment to .00005".

the operator to watch the action during truing, and in the case of the regulating wheel, to allow the operator to adjust the truing of the diamond for different work heights as well as to inspect the truing action.

A swivel sub-base for the regulating wheel provides for taper correction with a positive means of locking after taper correction by bolting to the base. The wheel head is easily adjusted on gibbed ways by engaging a graduated handwheel which turns a feed screw engaging a full nut on the slide. Tilting of the head is easily accomplished by simply adjusting bolts and calibrated scale. The head is readily locked in place by a locking nut.

The work rest blade is mounted on the regulating wheel sub-base and swivels with the regulating wheel, thus eliminating additional adjustment when correcting for taper. It should be noted that by providing a work rest blade mounted on the regulating wheel, work loading alignment is greatly simplified. As the grinding wheel wears, the wheel slide is moved closer to the work rest; thus, there is no need for constant resetting of the work conveying equipment. This feature is especially timesaving where two or more machines are fixed together on conveyor lines in a single production line.

Speed of the regulating wheel is provided by variable pitch sheaves with a calibrated scale and a simple knob which makes speed changing for truing simple and fast. Grinding speeds and truing speeds are independent. A push-pull knob selects either immediately, thus allowing the operator to change from grinding to truing speeds with no searching.

The grinding wheel head moves on hand scraped ways of ample area to insure low unit pressure and long way life. This use of hand scraped ways gives better vibration dampening than anti-friction ways. It also requires less wheel head mass and feed screw mass than anti-friction way design. The grinding wheel is fed to the work for stock removal by an extremely accurate rotating feed screw engaging a large half nut mounted on the bottom of the head. Feed is provided in increments of .00005 inches by means of either a feed lever or a hand wheel.

Work rest is mounted on the regulating wheel head thus eliminating adjustment by following the wheel when head is swivelled to correct for taper.

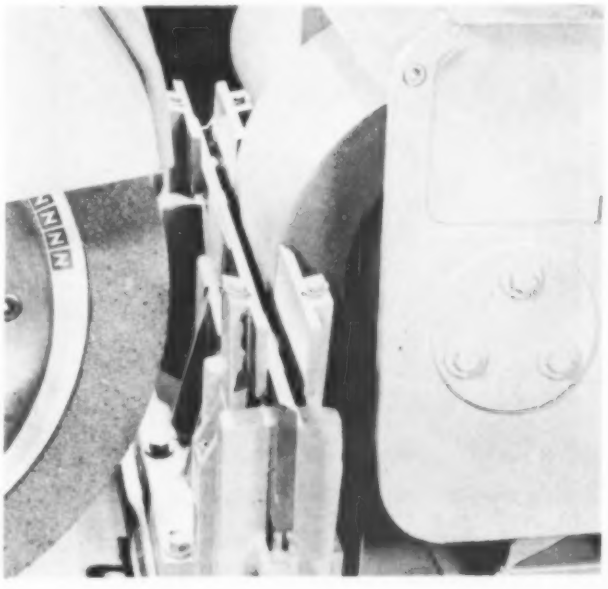
The standard grinding wheel truing unit is hydraulically powered and operated by a simple directional lever on the top of the guard. Adjustment of stop dogs limits travel in each direction. Truing speed is adjusted by controlling the rate of hydraulic oil exhaust.

Truing slide horizontal motion is accurately controlled by gibbed anti-friction ways, giving positive tracking for accurate wheel contouring, and consistent truing speed of diamond for better control of wheel surface. These ways also insure consistency of surface finish on the work piece and consistency of grinding action.

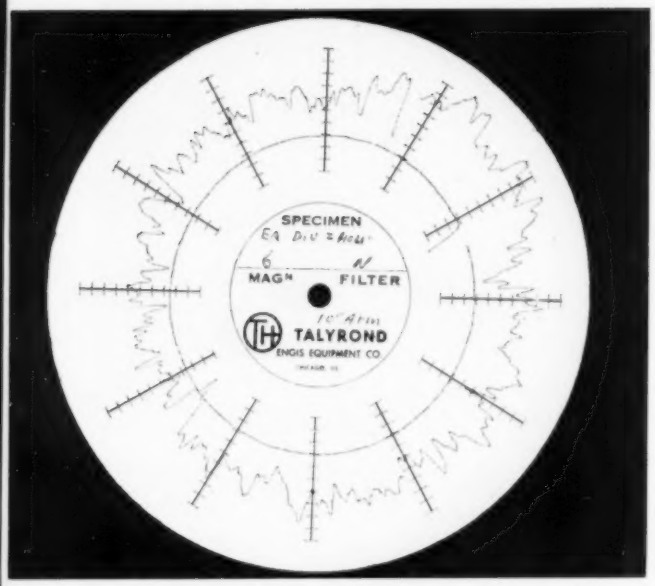
With this truing unit, it is possible to true 90° steps with angled lifting ramp, and gravity keeps follower in positive contact with form bar in both directions.

A simple, manual, graduated handwheel selects the amount of diamond feed. The coolant line through the ram directs the coolant to the point where the diamond is truing.

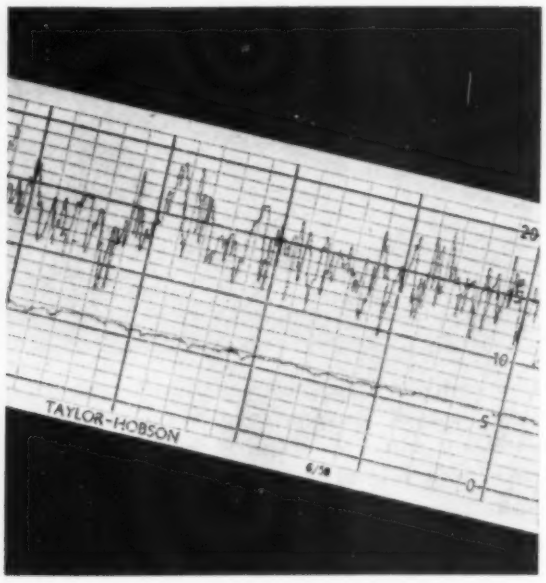
The regulating wheel truing device moves on a horizontal gibbed dovetail, and cross movement is controlled by a hand wheel. • • •



Finishes to Under One Microinch on Lathe



The Talyrond chart shows the deviation from a perfect circle of a die set guide pin. The inside circle is after Microstoning to .00003". The outside is ground to .00028". Chart courtesy of Engis Equipment Co.



Talysurf chart shows surface finish of the same part with the ground surface reading of 20 microinches and a Microstoned surface reading of 1.5 microinch average. Chart courtesy of Engis Equipment Co.

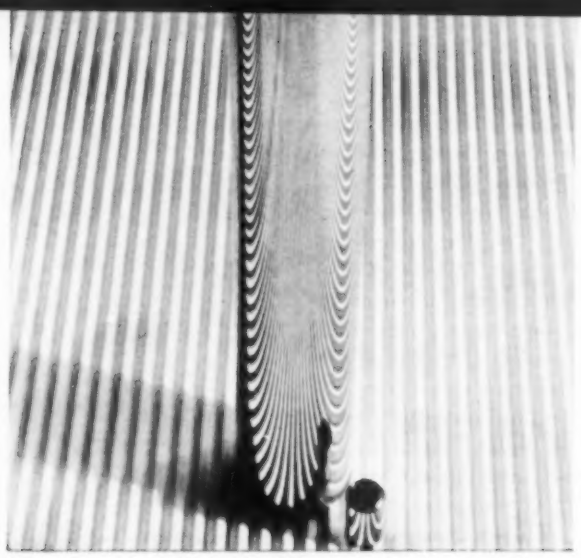
● On the premise that fine finishing is not a function of the grinding machine, the Taft-Peirce Manufacturing Company of Woonsocket, R.I., has announced the acquisition of a license to manufacture and sell the complete Supfina line of Microstoning machine tools and attachments in this country. Microstoning is a super finish, final finishing process that generates a controlled microfinish as fine as less than one microinch on practically any material, and corrects geometric errors caused by previous machining operations. Taft-Peirce was quick to recognize the outstanding features of the Supfina attachment, which can be mounted on the tool posts of engine lathes, vertical turret lathes, boring mills, planers, or on the heads of cylindrical grinders. The process is equally well adapted either to single piece finishing or to production type work and is as effective on conical and flat surfaces as on cylindrical.

This Taft-Peirce Supfina Attachment is being used to produce a controlled finish of one microinch on a 1¾ inch diameter x 20 inch long steel guide shaft.

The process of Microstoning presents a large abrasive contact surface to the work at a low constant pressure similar to super finishing and honing operations. This permits gentle removal of surface imperfections with practically no development of heat. At the same time, the enveloping action of this type of tool has the effect of improving geometrical shape of the work. While wheel dressing is an operation indispensable to grinding, Supfina stones do not need to be dressed because they are self-sharpening. This means that they are relatively soft, and also must be highly uniform in structure and grade.

Microstoning is done in steps—each step should remove all finish marks left by the preceding operation. This means that each stone does the job it is best suited for, which, of course, requires a great range of grit sizes. This range is from 60 to 1200. The coarseness of the first stone depends upon the initial roughness of the work, and the progression to the finer stone can be interrupted whenever the desired finish has been obtained.

There are two models of Supfina attachments—No. 9680 and No. 9681. The larger, No. 9681, is recommended for diameters over 1" to an unlimited capac-



This roll is mirror-finished so finely by Microstoning, it cannot be measured with conventional stylus type surface indicating equipment.

ity. Both units have a minimum diameter of ¼". These attachments are operated on air pressure alone. There are no electrical controls. Two air valves located on the operator's side of the attachment provide the control for stone pressing between 20-40 lbs. and oscillation between 2000 and 2500/min. Rotation of the work and traverse of the unit must be provided through the controls of the machine on which the attachment is mounted. Using a minimum of air, a free-floating piston inside the head of the attachment moves in opposition to the body. The action accounts for a lack of any externally transmitted vibration in the unit.

When mounting the attachment on the lathe, the only maintenance usually required is the tightening of the gibs. Setup of the Supfina attachment follows rather simple steps, the first being to clamp mounting bar attachment to the toolholder, tapping it into position so that the mounting pin is parallel to the axis within .002" in its length, using a dial indicator. The next step is to locate the workpiece between centers, using a live center in the tailstock. The attachment is then slipped on to the mounting pin and tilted so that the empty stone holder is about 1½" above the work, and the center line of the stone guide passes through the center line of the work. The attachment is completely pneumatic; therefore, there are no electrical connections and the only connection when mounting the attachment is that for the air supply. After proper selection of stone is clamped in the stone holder, the valve is pushed to press the stone against the work. The new stone should then be shaped to the work by use of sandpaper which is placed between the stone and the work, with the abrasive side facing the stone. The stone is then oscillated under light pressure.

There are three basic Microstoning methods. One is to choose a stone so that it removes rapidly the initial roughness of the work, but then automatically stops cutting because the newly smooth surface is no longer capable of dressing the stone. It should be noted that this method will not remove the deep local imperfections completely. This method and the following two methods, however, do remove the amorphous metal, leaving a surface of base metal only.

The second method is primarily a stock removal method which is possible by giving the stones a dual nature. This is done by roughing in relatively low speeds, 50 feet per minute, which allows a stone to cut freely longer, then increasing the speed to about 150 feet per minute, which tends to glaze the stone, thus polishing the workpiece without removing stock. The next rough workpiece will then dress the glazed stone so the new cycle may begin.

The third method is utilized for continuous stock removal. The roughness being produced is sufficient to keep the stone sharp. This method is commonly used when there is continuous traverse feed between the stone and the work. The surfaces produced in this way are generally matte grey in appearance, unless the process is carried through to very fine grit sizes. If a high polish is desired otherwise, it is obtainable by using either bakelite bonded graphite filled stones or polishing paste and felt.

Stone types in the grit range of about 180 to 1200 are nearly all silicon carbide. Silicon carbide's greater sharpness and friability provide a cleaner cutting action on all materials. For polishing jobs, a special bakelite bonded type stone is available which contains graphite. Diamond tools are also required for finishing tungsten carbide and certain high speed steels. These might be either resinoid or vitrified diamond stones. For extremely fine finishes, a wooden block is substituted for the stone, and a hard felt pad is provided for use with diamond lapping compound.

The action of the stones is also influenced by the surface speed of the work, oscillation, the feed per revolution, and the contact pressure of the stones, as well as the workpiece material. Normal starting point for the surface speed of the workpiece is 50 feet per minute, but as requirements indicate, speeds of 20 to 150 feet per minute are used for rough and medium finishes, while speeds of from 100 to 400 feet per minute are used for fine finishing. It should be noted that a soft stone acts harder when the speed is increased and vice versa. The amplitude of oscilla-

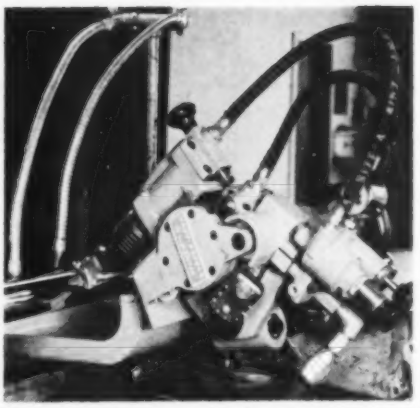
The relative light weight Supfina attachment can be easily mounted on the tool post of lathes.

tion is adjustable within limits—normally 0.08 to 0.20 inches. The higher the amplitude, the faster a stone will cut. The most common value used is .15 inches. The traverse feed may vary from .03 to .2 inches per revolution. In general, finishing time is minimized by using the highest feed rate that will still remove all traces of the previous machining.

The influence of the contact pressure is relatively slight. Normal pressure used is between 20-40 lbs. per square inch between the stone and the work. Excessive pressure has little effect on the cutting performance, but does produce friction which heats up the work. The pressure gage on the attachment indicates the air pressure supplied to the stone guide cylinder.

Microstoning develops a pattern in the form of sine-shaped grooves into the work, each groove being overlapped many times by the following ones, so that only the grooves produced by the last grains at the edge of the stone remain. Properly cutting stones will thus eventually produce patterns on the work surface, varying in shape according to the amplitude of the oscillation, work speed and oscillation frequency. To the unschooled eye, the regularity of the fine line pattern sometimes gives rise to an optical illusion that makes the finish appear rougher than it really is. If necessary, this illusion can be made to disappear by a fast polishing operation.

In Microstoning, material flaws such as seams and inclusions that often remain hidden in grinding become mercilessly exposed. In most cases, such slight surface defects are quite harmless; in fact only the very highest quality materials are free of them. This factor can even be a benefit, as in the case of a hard surface which contains soft spots due to defective heat treating, which will nearly always be made visible by a different appearance brought out by Microstoning.



Supfina attachment showing control valves, air pressure gage and silencer.

Microstoning is primarily a finishing process and is not ordinarily efficient for heavy stock removal or sizing. However, given a reasonably consistent surface finish on the work, and operating under constant Microstoning conditions, the material removed by Microstoning will be quite constant. This means that size consistency of Microstoned pieces will be just as good as those of the previous machining operation, unless special steps are taken. Typical diameter reductions are .0002 on finish ground work, .0004 on rough ground work, .0005-.001 on turned work. The first passes are always responsible for the bulk of material removed.

If finishes better than 4 microinches are required, it is necessary to subdivide Microstoning into steps of progressively finer finishes. In many cases, 2 or 3 steps are quite adequate, but if relatively rough work is to be carried through to a mirror finish, as many as 8 steps may be required.

The ultimate in fine finishes on any material is obtainable after Microstoning has reached its normal limit of .5-1 microinch average roughness, by polishing with a progressively finer series of accurately graded diamond pastes. These are applied with either hard or soft wood blocks initially, but for the finest surfaces, clean surgical cotton or fine felt is placed between the wood and the workpiece. The wood is clamped in the stone holder and oscillates just like a stone. No coolant is used, but the work surface is kept moist with a suitable solvent sprayed on occasionally.

• • •

BIG SAVINGS
FROM SMALL INVESTMENT
lowest price SURFACE GRINDER
in its class

9" Cross Travel

Greater capacity for high work

MODEL LG 812—9"x12" Wet or Dry, Hand or Hydraulic feed. Bench or Cabinet model.

MADE BY THE MAKERS OF THE FAMOUS BUTTERFLY FILING MACHINE

Butterfly

PRECISION SURFACE GRINDER

Avoids tie-up of larger machines—does small jobs faster—saves labor costs—longer cross travel 9"—greater working height under 7" wheel—11½".

The largest capacity of any small competitive grinder in the same price class. Also small size surface grinder 4"x8" for instrument makers.

Butterfly, smooth running, precision filing and sawing machine. Eliminates costly hand filing, sawing and lapping on dies gauges, tools.

Write for description, specifications and prices.

HARVEY MANUFACTURING CORP.
ESTABLISHED 1916
Subsidiary of GERMANOW-SIMON MACHINE CO., Inc., 100 St. Paul Street, Rochester 3, N. Y.
Use postpaid card. Circle No. 216

Finishing Aluminum Panels for Air Force Academy

The Air Force Academy needed 1000 aluminum panels with uniform finish and precision surfaces. Cupples Products Corporation completed this contract through the use of a drum sander.

● When the Cupples Products Corporation received the contract for fabricating and supplying 28' x 24' x 3/16" vertical aluminum panels for the exterior of the buildings of the Air Force Academy, they were faced with the problem of finishing 1000 sheets to uniform and precision surface specifications. These specifications called for a uniform surface finish of between 150 and 220 grit.

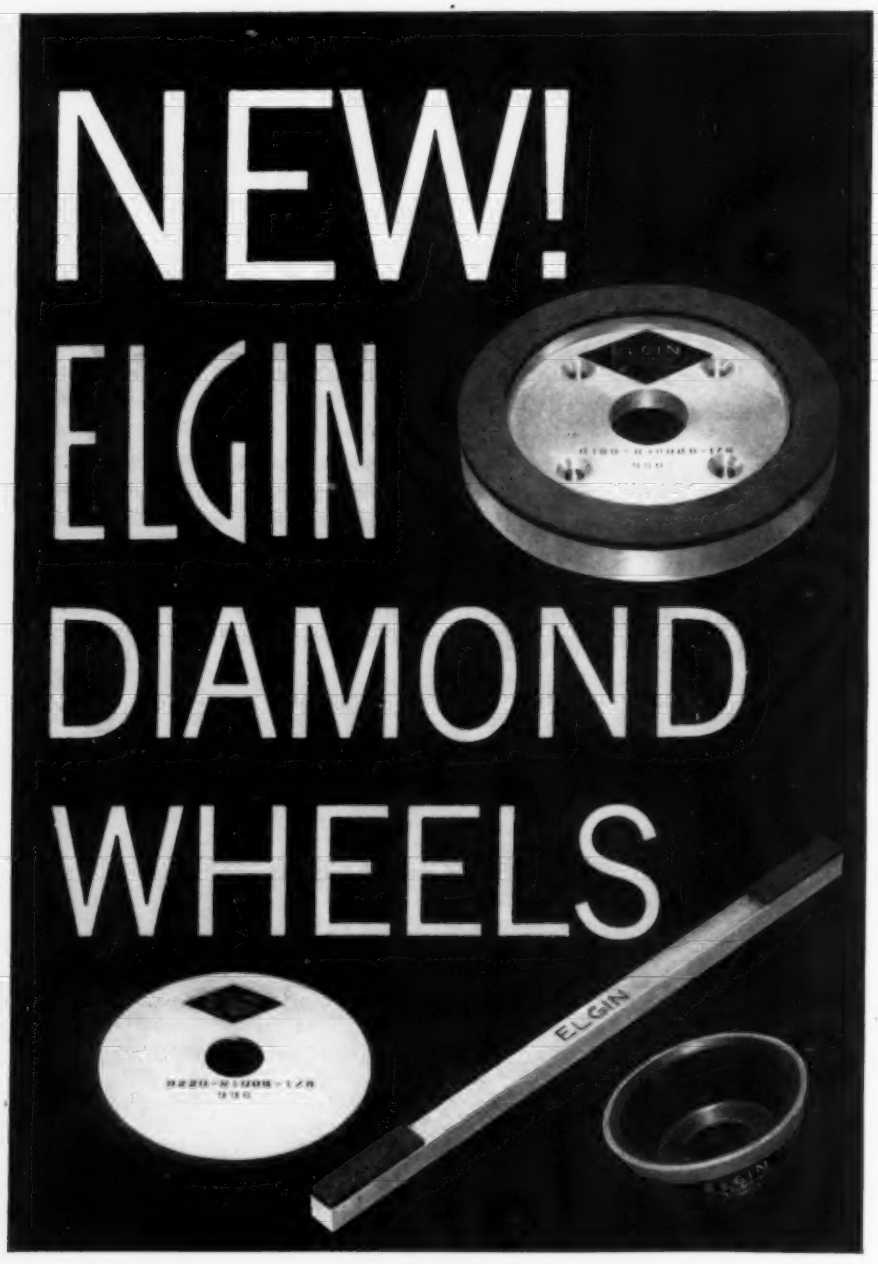
In order to obtain production and the uniform finish, Cupples could not rely on the use of their present equipment. This equipment consisted of stroke sanders. The stroke sanders required the use of wooden blocks for sanding pressure. These blocks were operated by hand and were not wide enough to cover a practical area of the sheets. The overlapping of passes and the variation in pressure due to the hand operation, greatly retarded production, and caused variation in the surface finish. After investigation, Cupples decided to purchase a Model GPL-50 Drum Sander manufactured by Timesaver Inc., Robinsdale, Minnesota. This machine greatly increased production, and by its very nature, increased the quality of work.

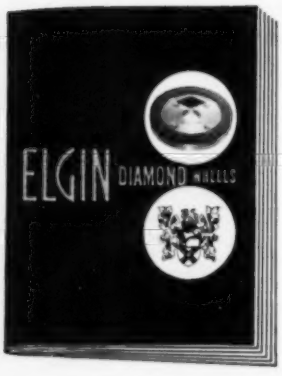
The purchase of the GPL-50 has made it possible to run these large sheets through at high speeds ranging between 40 and 80 feet per minute and still get a uniform finish. Sheet stock, Cupples formerly fabricated on a press brake prior to sanding. This operation marred and scratched the finish. The stroke sander then would remove these random defects. The Timesaver drum sander is now used before fabrication. After this finishing, a paper coating is applied which effects an overall cost savings.

Two men insert aluminum sheet into the GPL-50 Timesaver Sander.

Below: Two men from the front of the sander have moved to the rear to help a third man remove the finished aluminum sheet.

NEW! ELGIN DIAMOND WHEELS





Now – ELGIN offers you a complete line of Golden Circle Diamond Wheels with *guaranteed diamond content*

Diamond wheels—every shape, every size—resinoid, metal, or vitrified bonded—they're all available from Elgin! Guaranteed diamond content means more pieces ground per wheel, more return on your wheel-dollar. Consult an Elgin field engineer—his broad abrasives experience will help you select the right grit, wheel-shape, and bond—the wheel that will keep your grinding costs down. Our new diamond wheel catalog greatly simplifies ordering. Write for it today.

Abrasives Division
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

Use postpaid card. Circle No. 217

Mr. N. B. Barsha, Plant Engineer, with a background of men operating the Timesaver Sander.

While an ideal finish can be obtained on flat stock with one pass through the drum sander, extruded material, such as the aluminum panels, have to be cut down progressively. Starting with coarse grit cuts, four or five passes per panel, and finishing with fine grit belts, two passes per panel, the panels are handled by the drum sander approximately six times. For the Air Force Academy panels the machine handled approximately 168,000 feet of aluminum. This production is five times greater than could be achieved on the stroke sanders.

An additional advantage of the purchase of the Model GPL-50 was the small space requirement. This model needs only 28 square feet for the unit itself, plus the 30 feet on either side for handling the material. The compactness of the Timesaver makes it easy to install, simple to operate and able to be moved readily should need arise.

• • •

Semi-Automatic Gear Deburring Reduces Operation to Seconds

A time consuming job of gear deburring has been reduced from 20 minutes to seconds while improving the appearance and consistency.

Redin Gear Deburring Machine.

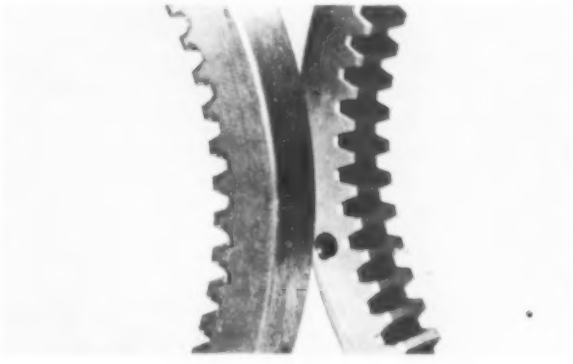
Special to GRINDING and FINISHING

● Gear deburring for many years has been one of the most time consuming operations in the manufacture of gears. Principally, this job has been a hand operation performed by unskilled labor using files to remove the burrs. Any precision was strictly up to the skill of the worker. The Redin Production Machine Company of Rockford, Illinois, is now manufacturing the Redin Gear Deburring Machine. The ability of this machine to semi-automatically deburr gears has greatly reduced the time of this operation.

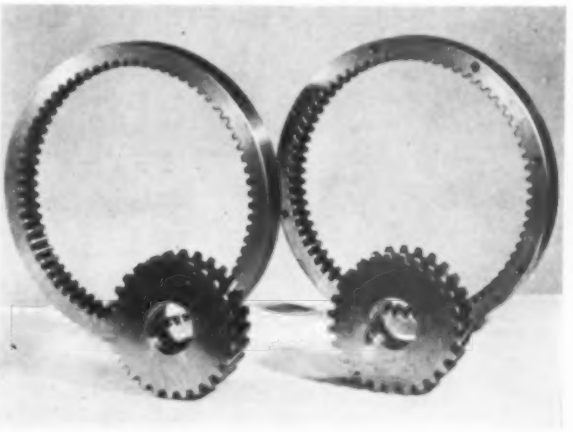
This machine consists of a completely enclosed work driver and the floating wheel spindle. Floor size for the unit is 40" x 47"—the unit itself being 48" high. Setup of this gear deburring machine takes five minutes or less. Setup, with the cover raised, consists of locating the gear in the work driver so that the gear is level with the top of the work spindle. This is an approximate measurement, required to be only within 1/16 of an inch.

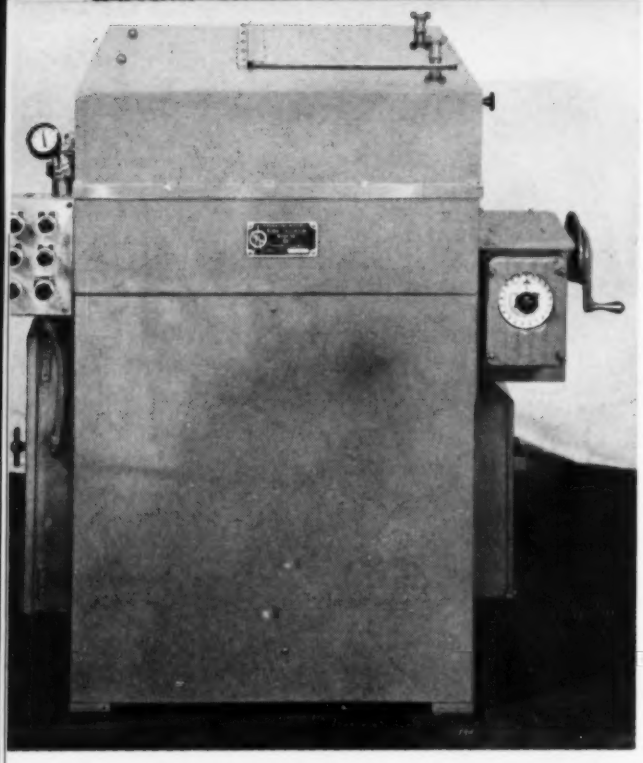
The cover is raised and lowered by a pneumatic cylinder, and is incorporated with a safety feature which shuts off all motors while the cover is raised. The next step is to set the selector switch on setup, with the spindle backed away from the gear. The wheel is then adjusted to the gear with the screw adjustment. A scale is provided to indicate the relative position of the floating wheel spindle to the work. A simple screw adjustment is provided for the wheel spindle. A counterweight on the floating wheel spindle controls the pressure of the wheel against the gear.

The next step in setup is to adjust the work speed or gear rotation in accordance with the diameter of the gear. A timer is set to produce the desired chamfer. This relates to the number of rotations of the gear. The floating of the spindle provides for the



The left hand view of the two gears shown above and below is before deburring. The right hand view shows the gear after deburring.

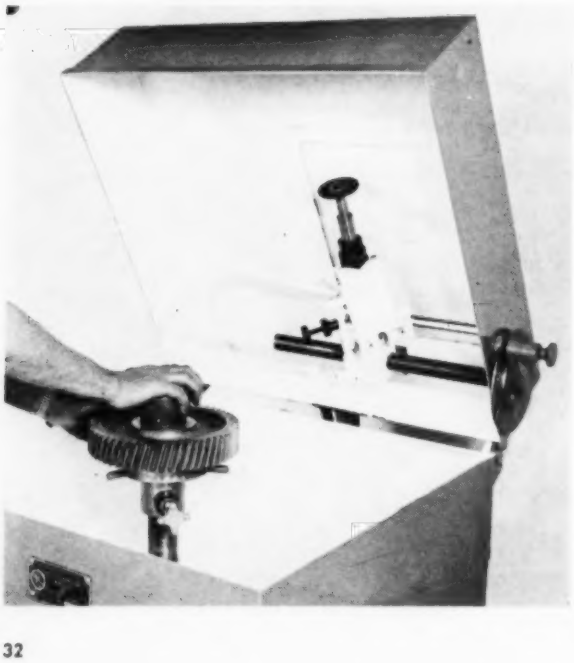




Front view showing the top down in operating position.

grinding from the root to the O.D. of the gear. The cover is then closed and safe operation of the gear deburring may proceed.

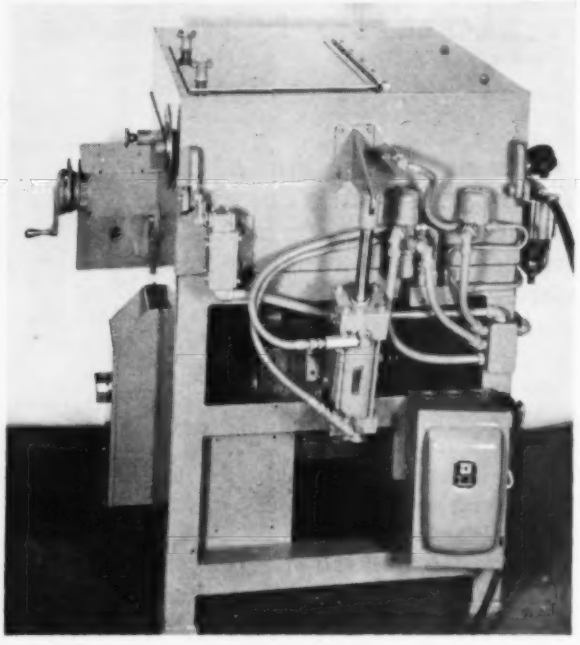
The Model 20 Redin Gear Deburring Machine has an external capacity of minimum pitch diameter of 3" to a maximum pitch diameter of 20". The maximum gear face which can be handled is 6", with a minimum diametrical pitch of 16. The internal capacity of this model is minimum pitch diameter 3", maximum pitch diameter 16", with a maximum gear face of 6". The minimum diametrical pitch is 16. The work speed is infinitely variable from 1 to 5 rpm. Wheel speed, through the use of an Aro air spindle, rotates at a speed of 11,000 rpm. The maximum wheel size is 4" in diameter by a ⅛" face. Controls for this equipment are all wired for 110 volts, with a standard operating voltage of 220/440 volt, 3 phase, 60 cycle current.



This view shows the gear being placed in position for deburring.

All pneumatic cylinders and the air spindle are operated on line pressure, controlled by a pressure gage. No dressing is required of the wheel as the varying contours of the gears keep the wheel self dressed. The wheels are reinforced, ranging in grit size from 24 to 120.

At a Midwest clutch manufacturing plant, this gear deburring machine has been in operation for over a year. Their processing requires that deburring take place between the hobbing and shaving operations. The type of gears to be deburred are spur, bevel and helical gears, which were formerly hand deburred by file, taking approximately an hour for 3 gears, both



Rear view of the machine showing the air cylinder for raising the cover and the dust pan on the left.

sides. Through the use of the semi-automatic deburring machine, each side is deburred in 32 seconds, with a consistency which was not matched in the hand deburring. This operation was formerly the longest operation in the manufacture of the gear. The 32 seconds per side was the operating time performed on a 15° helix gear with 61 teeth, 10.5253" pitch diameter, material 8620 steel, the gear having a 3.10" face. The production of this chamfer has prevented handling the gears with sharp edges, and spalling produced in heat treating has been virtually eliminated. The work driver is powered by a ¼ h.p. motor with infinitely variable speeds from 1 to 5 rpm. One tapered nut is supplied with the machine for the mounting of gears, other tapers are available in sizes within the range of the machine; this tooling is very simple and inexpensive. The air cylinder which raises and lowers the cover and wheel is cushioned at both ends to prevent any sudden stops. Heavy transmission gears have been produced at a rate of 250 gears per wheel. As the wheel wears, the spindle may be adjusted by means of a screw located on the right side of the metal cabinet. A dust collector pan is also provided for easy removal of dust within the unit. • • •

Man-made diamonds add the newest "Touch of Gold" value to carbide grinding

In carbide grinding the product-improving, cost-cutting "Touch of Gold," created by Norton leadership in diamond wheel development, began back in 1930. Today, man-made diamonds are adding something new to the "Touch of Gold." Their use as abrasives is steadily increasing, because of their improved performance and economy.

Norton was first to introduce all three bond types of diamond wheels . . . manufactures with complete uniformity of specification . . . produces the largest line . . . and *certifies* the diamond content of each wheel. Today, similar pioneering continues Norton leadership in the use of man-made diamonds . . . bringing you better performance, longer service life and lower grinding cost for every dollar you spend. NORTON COMPANY, Worcester 6, Massachusetts.

NORTON
ABRASIVES

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

The MURRAY-WAY JUNIOR FLAT POLISHER

a versatile, high quality unit with heavy-production proven features.

Available with conveyor, pinch-roll or coil feed.
Wet or dry operation.

- Adjustable, automatic oscillating idler roll for more uniform finish—longer belt life.
- Outside wheel adjusts for work thickness (0 to 4") in seconds. Entire belt roller and drive assembly mounted on one plate.
- Automatic, abrasive belt tension adjustment.
- Full length door makes belt changing easy, tension adjustment is automatic.
- Rigidly supported contact roll assures uniform work quality for full belt width.
- Base holds cartridge filters and coolant reservoir.
- Saves belt cost. Uses belts from 6" to 12" width.
- Neoprene contact roll is redressed on machine without special grinding attachments.
- Outside Ammeter indicates work pressure.

The Junior Flat Polisher is a compact, well built production unit for grinding, polishing or deburring flat surfaces in coils, sheets, blanks, bars, castings or fabricated parts at very low cost.

It is a standard size machine accepting work up to 12" wide, 4" thick and any length desired. Two or more units may be used in tandem to perform consecutive polishing operations.

Here is another of Murray-Way's well engineered, standard line items which offer the reliability of Murray-Way's years of experience, proven features and fine quality work at surprisingly low cost.

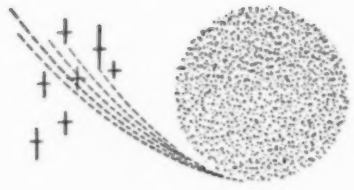
Murray-Way has a complete line of automatic polishing, grinding, filtering, coating and materials handling equipment . . . standard or specially engineered.

MURRAY WAY

MURRAY-WAY CORPORATION

P.O. BOX 180 MAPLE ROAD EAST • BIRMINGHAM, MICH.

Use postpaid card. Circle No. 219



Ideas from the Shop

SET-UP PLATEN FOR SURFACE GRINDING SMALL ANGLES

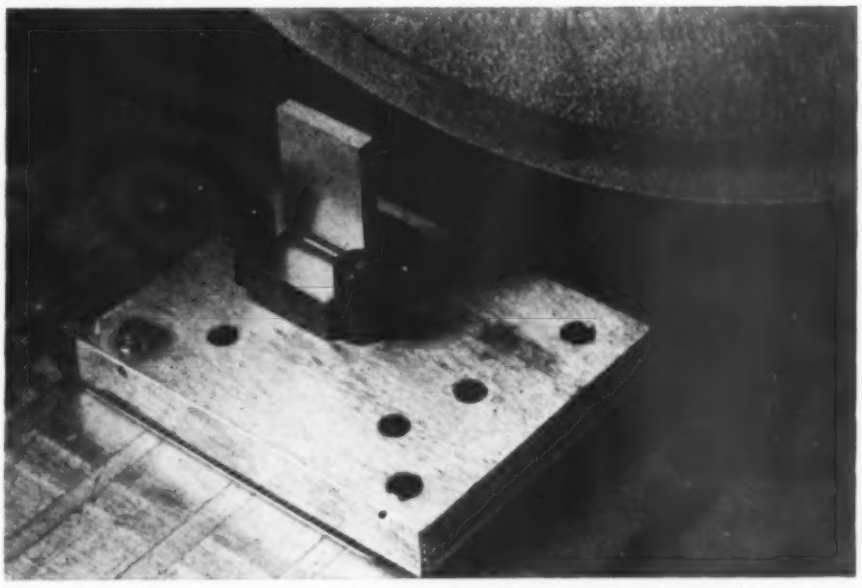
By H. J. Gerber

● The illustrated auxiliary platen is often used in our shop when it is necessary to surface grind just a few degrees of shear or draft angle on small dies and other tools.

The tool is very simple: A small block of CRS is ground parallel on its two flat surfaces and drilled and tapped on four corners for small half dog set screws. These set screws are adjusted to protrude from the bottom side when setting the platen to the desired angle. Setting is done on a surface plate, usually with a sine bar. Two screws are used for setting single angles and four screws are adjusted for setting compound angles.

The other holes drilled and tapped in the surface are for the purpose of securing the work pieces. These are usually positioned according to the size and shape of each work piece.

The illustration shows a small rectangular tool steel piercing punch having a shear angle ground on its face. For small jobs such as this we find that the air gap between the magnetic chuck and platen does not seriously affect the holding power of the chuck.



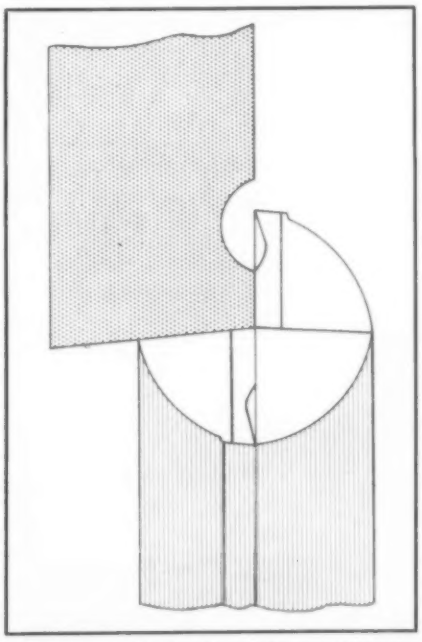
Auxiliary platen set up for grinding a few degrees of shear angle on the face of a small rectangular tool steel piercing punch.

CUTTING IN END TEETH ON TWO-FLUTE END MILLS

By Thomas Hindson

• Cutting relief in the end teeth of two-lipped end mills is usually a free-hand operation, on a straight wheel.

Nicking of the point of the tooth can be prevented if a hollow is trued in the side of the wheel and the face of the wheel is trued at a slight angle, as illustrated. The end mill is fed against the corner of the wheel.



Sketch of wheel shape for cutting in end teeth of two-flute end mills.

PROPER MOUNTING OF DIAMOND WHEELS

By Christopher H. Hill, Sr.

• Very seldom does one find a diamond wheel in which the bushing is an exact fit on the wheel spindle or on the wheel sleeve. When a wheel is mounted on a wheel sleeve or spindle, and the hole, for example, is .004" larger than the spindle or sleeve, then the wheel will drop down .004", with the top of the bushing resting on top of the spindle and leaving a .004" gap between the bottom of the bushing and the bottom of the spindle.

If the flanges are tightened without compensation for this error the wheel will be out of balance and .004" out of truth on the periphery. Should the

wheel be trued in this condition there is a loss of diamonds equal to the out-of-round condition of the wheel face, and still the bore is not concentric with the periphery.

To compensate for this, one of two ideas may be used.

The preferred method is to insert three pieces of .002" thick shim stock approximately 120° apart between the spindle or sleeve and the wheel bushing. This will make the periphery of the wheel run approximately true, and the wheel can be trued without significant loss of diamonds.

If shim stock is not available, the wheel flanges can be tightened just enough so that the wheel will slip easily. Then, using a dial gauge, the wheel can be tapped gently until the periphery runs approximately true. When this condition is reached, the wheel flanges can be tightened.

"STEPPED" GRAVITY FEED CHUTE FOR GRINDER

• Nylon retainers in this gravity chute feeding bearing cones to a grinding machine at The Timken Roller Bearing Company's plant in Bucyrus, Ohio, prevent the parts from being damaged by bumping against one another in an abrupt fall.

The nylon steps, located on alternate sides of the chute, slow the cups down, keep them from falling any damaging distance in a straight line. The set of retainers on the right side of the chute (see photo) can be adjusted to permit various sizes of cups to be fed through the chute.

Gravity feed chute. Nylon retainers on the bolts extending through the chute keep the cups from nicking each other as they go through the chute.

MAGNETIC PARALLELS FOR SURFACE GRINDER

By Howard Levy

• Magnetic parallels for use on the magnetic chucks of surface grinders can be made quickly and easily.

I have made an excellent pair of this type of magnetic parallel using aluminum blocks with cold rolled steel plugs pressed into drilled holes in the blocks. After being squared on a surface grinder, they held work more securely than the conventional laminated type.

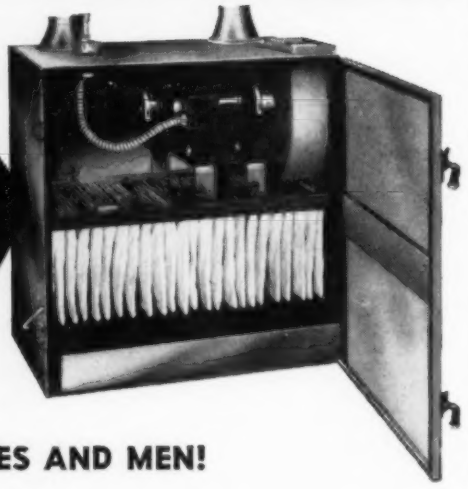
However, any convenient non-magnetic material may be used — plastic, hard rubber, or even hard wood.

WHAT'S YOUR IDEA?

Ideas from the Shop is basically the same department that we used to call **SHOP HINTS**—practical suggestions from shop men to other shop men, the unwritten short cuts that every shop develops. Only the name has been changed. So . . . **What's YOUR Idea?** Our other readers would like to know, and you'll be paid for it to boot. Send your ideas to IDEAS EDITOR, GRINDING and FINISHING, Hitchcock Publishing Co., Wheaton, Illinois.

STOP SHOP DUST IN ITS TRACKS!

WITH THE EQUIPMENT THAT *FIGHTS* IMPURE AIR IN INDUSTRY.



THE CINCINNATI AIR MASTER

THE ANSWER TO DUST, GRIT, GRIME THAT DOOMS MACHINES AND MEN!

GRINDING
BUFFING
POLISHING
DE-BURRING

Metal and wheel grit from grinding, buffing, polishing and deburring is trapped by Airmaster instantly, filtered out by fabric and steel wool bags. Only clean air, grit-free and safe for both men and machines, is discharged. Rugged construction and simplicity of design has made the Cincinnati AIRMASTER famous.

Featured nation-wide by leading distributors. Write for catalogue TODAY!

Makers of a complete line of pedestal and bench grinders and buffers, speed lathes, dust collectors and cut-off machines.

THE CINCINNATI ELECTRICAL TOOL CO.
214 MT. HOPE AVE. CINCINNATI 4, OHIO

Use postpaid card. Circle No. 220

Loring Coes

William L. Kenagy

Eugene Hoyet

R. H. Wentorf

G. M. Butler

H. Nathan Stone

Abrasive Industry Leaders Brief Young Engineers

Specialists discuss various phases of manufacture and use of abrasives in unique three-week program.

Special to **GRINDING** and **FINISHING**

● Some thirty-one leaders in the abrasive industry spoke to a group of approximately 75 undergraduate engineers in a three-week abrasives symposium sponsored by the Alfred University College of Ceramics in June. Topics for the lectures ranged all the way from natural abrasives to man-made diamonds.

A required part of the curriculum for students, the symposium also drew a number of visitors from companies specializing in the field.

The main lectures of the opening day of the symposium were delivered by Dr. Gurdon M. Butler, manager, engineering research branch, The Carborundum Company, "Future Developments in the Abrasive Industry," and by William L. Kenagy, vice president of Simonds Company, "Engineering in the Abrasive Industry."

The remainder of the first week was devoted to lectures on natural abrasives—emery, corundum, garnet and diamonds. Major lectures were given by Asher Nesin, president of Micro Abrasives Corporation, "Manufacture of Emery and Corundum Abrasives" and by Albert L. Ball, Technical Consultant, Bay State Abrasive Products Company. Eugene Hoyet, manager, surfacing laboratory, Pittsburgh Plate Glass

Theodore Zak

Asher Nesin

Norman Kendall J. F. McMahon

L. B. Bassett Richard O. Lane

Charles Jacobs

F. C. Regan

James E. Price

Company, spoke on "Use of Sands in Grinding and Polishing."

The general theme of the second week of the program was manufactured abrasives, with primary emphasis on silicon carbide and aluminum oxide.

Richard R. Harvey, sales manager for the Grain Division, Electro Refractories and Abrasives Corporation, spoke of the manufacture and history of silicon carbide, while Dr. Otto L. Forchheimer, assistant director of research for General Abrasives Company, covered the same area for aluminum oxide. The production of fine abrasives was handled by Dr. Rufus N. Palmer.

General subjects in this area were discussions of crushing, treating and sizing by D. K. Bray, manager of quality control for General Abrasives; of quality control and testing, by F. Paul Ronca, manager of silicon carbide product engineering department, from Carborundum's Electro Minerals Division, and of the use of abrasives in grinding and polishing, by Randolph D. Anderson, abrasive sales engineer for Norton Company.

Dr. R. H. Wentorf, of the Chemistry Research Department of General Electric, spoke on "Man-Made Diamonds," whiles Loring Coes, assistant director of research and development, Norton Company, discussed "Special Abrasives (Carbides and Borides)".

The concluding lecture of the week was a lecture by Darwin H. Knapp, Jr., of the Coated Abrasives Division of Carborundum.

Theodore Zak, superintendent of process development, Bausch and Lomb Optical Company, discussed "Effects of Grinding and Polishing Glass."

Dr. H. N. Stone, director of research for Bay State Abrasive Products Company, led off the third week with his lecture on "Research and Development of Bonded Abrasives," setting the general theme for the week.

Other lectures on bonded abrasives were the following: "Kilns," Philip Dressler, vice president, Swindell-Dressler Corporation; "Structure and Grade," William J. Eames, product engineer, Electro Refractories & Abrasives; "Organic Bonds," N. P. Robie, assistant director of research for the same company; "Inorganic Bonds," Norman Kendall, Cortland Grinding Wheels Corporation; "Quality Control," by R. H. Rushmer, manager of quality control, and P. S. Boucher, of the Bonded Abrasives Division, Carborundum; and "Grading," by James E. Price, research manager for Simonds Abrasive Company.

"Zirconia and Zirconia Titania as Abrasives" was the subject discussed by Charles Jacobs, senior ceramist, Titanium Alloy Manufacturing Division, National Lead Company.

Kenneth L. Bates, field engineer for Norton, talked on "Basic Principles of Grinding." Two films, "Coated Abrasives," from Behr-Manning, and "Use of Abrasive Wheels," from Norton, were shown.

The concluding lecture of the program, "Sales Engineering in Abrasives, was delivered by Richard O. Lane, vice president, Research and Development Department, of Macklin Company.

Chairman of the program was L. B. Bassett, Associate Professor of Research, Emeritus, while the program was under the general direction of Dean J. F. McMahon, both of Alfred University's College of Ceramics.

• • •

Kenneth L. Bates

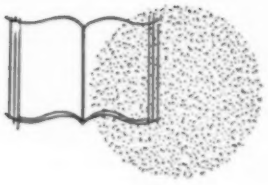
F. Paul Ronca

Rufus N. Palmer

N. P. Robie

O. L. Forchheimer

Richard R. Harvey J. F. McMahon



Literature

1. "Carbide Grinding With Man-Made Diamond Wheels" is the title of a four-page folder which provides a practical condensation of facts and recommendations on man-made diamond wheels. It sets forth in concise usable form the characteristics of man-made diamonds, diamond wheel shapes and application recommendations. The Carborundum Co., Niagara Falls, N.Y.

(See Number 1)

2. Pencil Grinder. Bulletin No. 61 gives the features and specifications of the new air-powered Rotor M1223, D-03 pencil grinder. It is reported excellent for use with small carbide cutters, burrs, mounted points, and drills. Specifications include, max. O.D., 1-1/32"; 40,000 rpm; weight, 12 oz. The Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.

(See Number 2)

3. Semi-Automatic Polishing and Buffing Machines. Type A-2, a two-spindle, hand indexing machine used with lathes for polishing and buffing cylindrical parts up to 12" in dia., the A-2-D handling out of round work, the B-10, a single spindle machine for working on cylindrical parts, and the L-4, an automatic indexing machine with four work spindles are some of the types described in recent catalog. Illustrations, specifications, and data for each machine are covered. Acme Manufacturing Co., 1400 E. 9 Mile Rd., Detroit 20 (Ferndale), Mich.

(See Number 3)

4. Ultrasonic Grinding and Machining Service of hard and brittle materials such as glass, quartz, ceramics, sapphire, carbides, hardened tool steel, ferrite, and similar materials previously considered unmachinable is being offered by Precision Glass Products Co. Illustrations in the literature show products which have been machined. Holes as small as 0.006" dia. are said to be drilled, tolerances are as little as .0005", and a 10 microinch surface finish. Precision Glass Products Co., 6138-40 Beechwood St., Philadelphia 38, Pa.

5. Cyclone Separators, in eight models, are presented as an effective means of dust control in protecting machinery, products and employee health. Multiple rating tables, complete specifications and a dimensional drawing are also included. Torit Mfg. Co., Dept. KP-1, Walnut and Exchange Sts., St. Paul, Minn.

6. Abrasives. The Verticoat Lam-Loc abrasives are described in bound catalog sheets. These price lists include Atlas equivalents to trade names, a comparative grading chart, a listing of machine belt sizes, and availability of coated abrasives according to grade number, coating, sizes, backing, and material. Atlas Abrasives Corp., Greenwich, Conn.

7. Cylindrical Grinding Machine. The Jones-Shipman Model 1212, 5"x12" capacity, is described in folder. Specifications cover wheelhead in-feed graduated in increments of .000020"; table traverse, two rates—coarse and fine; and roundness —on dead centers 0.000010"/.000015", on live standard workhead, .000050". Illustrations of the parts, colored diagrams, and attachments are provided. A. A. Jones & Shipman, Ltd., P.O. Box 89, Narborough Road South, Leicester, England.

8. Metal Parts Finishing Cost Guide is designed for determining and comparing costs involved in metals finishing procedures: (1) on-premises finishing of parts, (2) off-premises finishing of parts, and (3) use of pre-finished metals. Easy-to-follow instructions are included in the guide, with outlines for each of the three metal finishing procedures. Apollo Metal Works, Dept. GF-3, 66th Place & S. Oak Park Ave., Chicago 38, Ill.

9. Resilient Coated Abrasive Wheel for polishing and surface grind-blending, called the Grind-O-Flex, is described in folder. Offered are new types for controlled abrasion in small sizes for getting into confined contours and large sizes for use on heavy automatics. Illustrations depict mountings on portable electric drill motors and on motor shafts. Price list included. Merit Products, Inc., 3691 Lenawee Ave., Los Angeles 16, Calif.

10. Buffs presented in folder include bias type buffs for super-heavy cut, all metals; sisal-cloth multitooth, for contour work, heavy cut of hard metals; cloth multitooth, for light, fast cut of contour work; open face (bias type) sisal-cloth for fast-cutting of cold rolled and stainless steel, and stitched (bias type) sisal, for tough operations in drawn, stamped or cast metals. Compounds are available for all metals. Schaffner Manufacturing Co., Inc., Schaffner Center, Emsworth, Pittsburgh 2, Pa.

11. Electronic Air Cleaner. 16-page Bulletin 249A describes the Model B Rollotron electronic air cleaner. Included are details of operation and electronic principle, an explanation of the agglomerator

(See Number 9)

FREE LITERATURE *continued*

and storage sections, equipment drawings, capacity and dimension tables, specifications, a list of typical installations and a graphic description of the horizontal version of the Rollotron (known as the Type H). American Air Filter Co., Inc., Dept. PD, 215 Central Ave., Louisville 8, Ky.

12. Indexing Table. The Ultradex indexing table, outstanding for accuracy as well as speed, is described in Bulletin X59 as providing angular indexing to any degree setting within ¼ second of arc. Specifications on two models are included and illustrations show construction details, testing operations and actual applications. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

13. Materials Handling Equipment. Catalog No. 596 in 68 pages discusses Syntron's materials handling equipment, parts handling equipment, power rectification equipment, mechanical shaft seals, paper joggers, and portable power tools. Data and specifications are given, with illustrations to show products in operation. Syntron Co., 1253 Lexington Ave., Homer City, Pa.

14. Precision Portable Balancers, as described in folder, offer a fast, accurate and dependable way to balance grinding wheels without removing them from the machine. The Aero balancers are specified for the Cincinnati No. 2 centerless grinders. Diagram shows the sections of the unit. Testing reported shows repeated accuracy within .000040" displacement. Aero Supply Mfg. Co., Inc., Corry, Pa.

15. Safety Index Test to predetermine the accident-causing "injury repeater," is described in eight-page brochure available from Executive Assets, Inc., 17 Battery Place, New York 4, N.Y.

16. Glass-Jet Peening. No. PPD-124 technical review describes the Perfecto-Peen process of glass-jet peening using pure

(See Number 12)

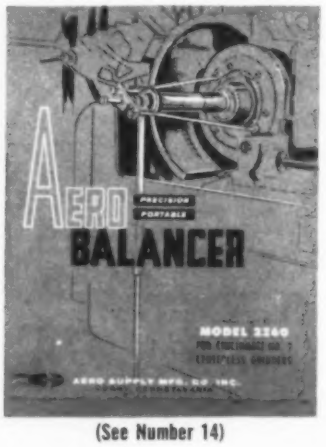
minute glass beads in a slurry solution which improves surface finishes to 4mu rms. Included are typical peening applications, and a chart on fatigue life improvement. Perfecto-Peen, Div. of Aero-Test Equipment Co., P.O. Box 10627, Dallas 7, Tex.

17. "Tumb-L-Matic News" is the title of a monthly newsletter beginning in August and designed to keep the reader up to date on new equipment, compounds and media, as well as new and improved barrel finishing techniques. Anyone concerned with this field is invited to send names and addresses of those interested to Tumb-L-Matic, Inc., St. Mary's St., Stamford, Conn.

18. Flat Finishing. Literature available describes how the Hammond flat finishers grind, polish, and deburr in one operation. They finish flat work such as sheets, bars, strips, stampings and extrusions with one machine, one operator and one pass. The units are available in 6", 8", 10" and 12" widths, and handle work up to 6" high. Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich.

19. Micronic Filtration. Four-page brochure No. BFD-53 describes the research, engineering, production and quality control functions of the Bendix organization in the field of micronic filtration. Various specialized production machines, equipment and operations are illustrated in a series of photographs. Bendix Filter Div., Bendix Aviation Corp., 434 W. 12 Mile Rd., Madison Heights, Mich.

20. Wall Chart of Conversion Factors. Chart includes common conversions such as inches to centimeters or watts to hp, as well as many conversions that are difficult to locate in reference manuals. (Some examples are atmospheres to Kgs/

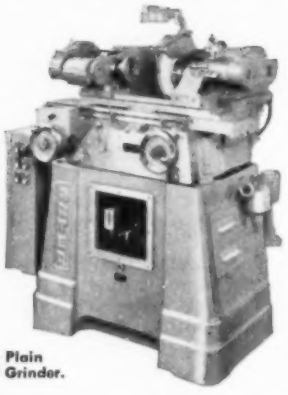


(See Number 14)

Best buy for tool room or small capacity production grinding

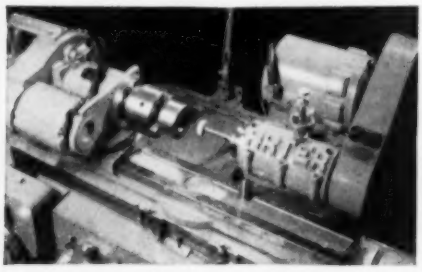
Here's a real dual-purpose machine that can be arranged for either internal or external grinding simply by changing wheelheads. Relatively low in price, it can handle toolroom as well as the production jobs requiring a small capacity machine.

Separate wheelhead units are furnished for internal and external grinding. Thus, the basic machine can be purchased for either type of application and auxiliary equipment added at a later date. Internal wheelhead is bored 3" to take ball-bearing mounted spindle assemblies of 15000 or 32000 rpm. Work-head can be swiveled 90 degrees, has a graduated plate that provides accurate settings up to 30 degrees either side of center.



Internal or Plain Cylindrical Grinder.

Standard features include complete hydraulic movement of table and wheelhead, centralized push-button controls, and diamond wheeldresser with graduated dial. Maximum feed is .0005", minimum is .0001" at each table reversal. Maximum capacities are: External, 3" O.D.; Internal, 3" I.D.



▲Internal grinding head set up to grind the bore of an arbor support bushing.

▲Workhead is swiveled 90 degrees in grinding face of a gear-shaper cutter.

Write today for details on the Sundstrand-Arter dual-purpose grinder. Bulletin 306.

SUNDSTRAND ARTER

SUNDSTRAND-ARTER Grinders

SUNDSTRAND MACHINE TOOL DIVISION OF SUNDSTRAND CORPORATION

Belvidere, Illinois, U. S. A.

Use postpaid card. Circle No. 222

sq. cm, cm/sec to miles/hr, cu.ft. to liters, microns to meters, quintal to lbs.) Precision Equipment Co., 4411E Ravenswood Ave., Chicago 40, Ill.

21. Aluminum Finishing manual, in a latest edition, discusses many different problems concerning the finishing of aluminum as well as methods and materials for taking care of these problems. Such operations as cleaning, deburring, etching, deoxidizing, descaling, preparation for welding and anodizing are covered—all pertaining to aluminum. Frederick Gumm Chemical Co., Inc., 538 Forest St., Kearny, N.J.

22. Magnifiers and Readers. 14-page illustrated Booklet I-52 lists over 65 individual models (powers from 2x to 20x) including round and rectangular readers, folding pocket magnifiers, watchmaker's loupes, surface comparators, enlarging focusing magnifiers, etc. Specifications and list price are included for each item. Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N.Y.

23. Face and Eye Safeguards. Bulletin 35-F features the 38 most important Sellstrom safeguards found in the firm's large general catalog, including welding and chipping goggles, welding helmets, face shields, industrial respirators, and a variety of replacement lenses and plates. Sellstrom Mfg. Co., Palatine, Ill.

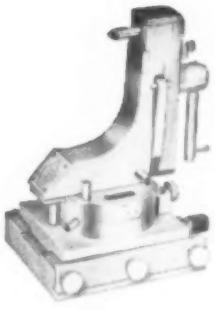
24. Filters. The CFC Honan-Crane filter, as described in technical literature, uses Palconia (inert cellulose) to remove chips and other abrasive particles. Machines are cleaned once a week by use of the Honan-Crane sump cleaner. They are then refilled with clean oil purified by the CFC Honan-Crane filter. These filters can be engineered to the customer's requirements for all types of industrial oils. Commercial Filters Corp., Melrose 76, Mass.

25. Magnetic Chucks. Bulletin A-353 describes the Sundstrand magnetic chucks for holding small, medium, or large parts. The bulletin states that the deep penetrating power of the chucks makes it possible to hold a great number of small parts or large castings. Setup is simplified and clamping time is greatly reduced. Sundstrand-American Broach, Division of Sundstrand Machine Tool Co., Ann Arbor, Mich.

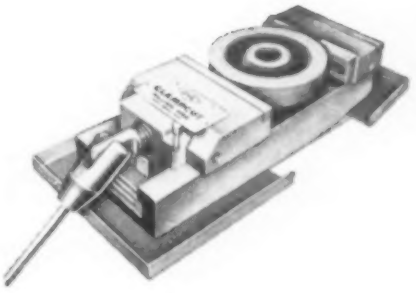
26. Barrel Finishing Machines and Media. The "Almco Album of New Products" includes a collection of new Almco catalog literature, all contained in a file-size folder, and featuring the company's new barrel finishing machines, methods, and

(See Number 23)

J&S DOWN-HOLDING DEVICES and WHEEL DRESSERS LEAD THE FIELD

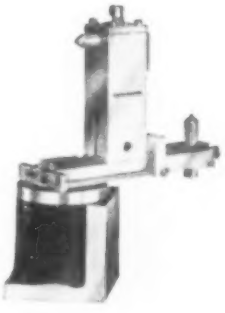


Fluidmotion Wheel Dressers—Dress two angles tangent to a radius, using ONE handle in one continuous motion. Operation is so fast and simple that beginners can use them. For all types cylindrical and surface grinders.



J & S Swivel Vise—The only hardened and ground swivel vise that mounts low, swivels, needs no pedestal. Patented down-holding clamping jaws give many times the holding power of an ordinary vise, yet only half the weight.

J & S All-Purpose Jaw Clamps — For any machine table or face plate. Five models—one adjusting screw has a holding force of 2½ tons on Small model, 12 tons on Jumbo model. Eliminate u-clamps, straps and fingers. No obstruction problems, no interference with measuring tool readings.



J & S Form-Master—Sturdy wheel dresser for shops with less frequent wheel dresser requirements. High quality, 100% dust-proof, it is capable of dressing any radii up to 12″ convex, up to 15″ concave.

Write for free literature and further information.

J&S TOOL CO. INC. — WHEEL DRESSERS · JAW CLAMPS · PRECISION VISES · DOWN-HOLDING DEVICES

CLAMPCUT

J & S TOOL CO., INC.

880 DORSA STREET
LIVINGSTON, NEW JERSEY

Use postpaid card. Circle No. 223

FREE LITERATURE continued

media. These products include spindle machines, tumblers, roll barrels, etc. Almco, Queen Products Div., King-Seeley Corp., Albert Lea, Minn.

27. Blast Cleaning Equipment. Bulletin No. 705 describes the complete line of Pangborn heavy-duty Rotoblast barrels. Cut-away drawings and sketches show details of the Rotoblast wheel construction. Design features and capacities for each size of the five heavy-duty series are included. A planning chart gives dimensions and specifications for the 15, 20, 32, 72 and 102 cu. ft. barrels. Pangborn Corp., Hagerstown, Md.

28. Jig Grinding Machine. 23-page catalog, describing the Hauser 3SM precision jig grinding machine, is well illustrated with photographs and diagrams of the machine proper and parts. Four pages in the back of the catalog are devoted to over 127 special and standard accessories, most of which are illustrated. Carl Hirschmann Co., Inc., 30 Park Ave., Manhasset, L. I., N.Y.

29. Lapping Machine. The Lapmaster, described as the machine that put precision lapping on a production basis, is described in technical bulletins available. Whether there is a problem of flatness and finish on parts of some thousand pounds weight or pieces ⅛" in diameter, there's a Lapmaster to do the job. Lapmaster Div., Crane Packing Co., 6408 Oakton St. Morton Grove, Ill.

30. Motor Driven Work Head. Literature describes the Model B943 motor driven work head featuring spindle speeds of 150 and 250 rpm. Other spindle speed pulleys are available. Accuracy reported is .0002 t.i.r. or less at spindle nose, .0005 t.i.r. or less on test arbor 6" from spindle nose. K.O. Lee Co., Aberdeen, S.Dak.

31. Wall Chart of the Industrial Revolution describes the last 150 years which brought sweeping changes from a hand-made to a machine-made economy. The 22"x34" chart records the 157 major events of this period. It is a reproduction of the three-story-high educational display, "The Dawn of This Age," in DoAll's Hall of Progress. Single copies of the chart, 50c; 100 or more, 25c each. The DoAll Co., Des Plaines, Ill.

32. Barrel Finishing Equipment, as described in literature, enables the finishing of parts by the hundreds instead of methods finishing one part at a time. Also discussed are the advantages of successful finishing with the company's tumblers and buffers. H. W. Kramer Co., Inc., 120-30 Jamaica Ave., Richmond Hill 18, N.Y.

33. Oscillating Lapping Machine. As described in Technical Bulletin LG-59, the Hyprez oscillating lapping machine is reported to step-up feeds, speeds, and production in finishing cutting tools. The lapping wheels rotate as they oscillate across the firmly held tool—producing a geometrically accurate and scratch-free finish. Hyprez Div., Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

34. Vibrators. Bulletin No. 1930E gives detailed specifications for Model 1930E as well as construction features, standard equipment and general information. This 15 hp model is the latest addition to a line which includes 30 hp and 20 hp models of similar design. Lord Chemical Corp., 2068 S. Queen St., York, Pa.

35. Microstoning. A preview of Microstoning using Taft-Peirce Supfina standard machine tool attachments is presented in Engineering Data Bulletin No. MT-004. Microstoning is an abrasive final finishing process which generates a controlled microinch finish on practically any material and corrects geometrical errors of previous machining operations. Illustrations, diagrams, and applications show how this is accomplished. Taft-Peirce Mfg. Co., Woonsocket, R.I.

36. "The New International Inch . . . And How It Will Affect Your Operations" is a booklet offered which discusses the various problems a manufacturer can be expected to encounter as a result of America's changeover to the International Inch on July 1 of this year. Pratt & Whitney Co., Inc., West Hartford 1, Conn.

37. Automatic Infeed Grinding Attachment is described in catalog as increasing centerless grinding production 200% to 300%. This Feedcision unit can be used for trufeed as well as infeed for close sizing. Sizing dial is graduated in .00001". Three different feed rates are available. Modern Devices, Subsidiary of Twentieth Century Mfg. Co., Libertyville, Ill.

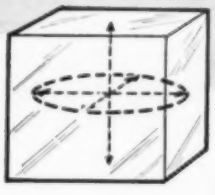
TRAVATROL

Electronic Traverse Control

TRAVATROL is a linear measuring and positioning control, providing accuracy and convenience. Operates from a single phase current supply. A wide range of models available, complete packaged linear positioning control, with variable speed D. C. motor drive, three dimensional position systems available. TRAVATROL systems offer remote control for air, hydraulic or electric valves and tracer systems.

Remote controlled linear travel reduces costly mechanical set-up time and eliminates manual readjustment of the limiting region.

TRAVATROL establishes and maintains a minimum distance of travel allowing point to point positioning over the entire traverse range. Controls for reciprocating members are equipped with dual adjustments for minimum and maximum travel range.



TRAVERSE DIRECTIONS UNLIMITED

...for Reciprocating Machine Beds
Indexing Rotary Tables
Positioning Work Heads

NEUTROFIER

Automatic Electro-Magnetic Chuck Control

A self contained unit operating from an alternating current source, providing full wave direct current combined with extremely versatile magnetic chuck control. Saves operator's time; speeds up production by quick and complete release of work. Provides means of retaining residual magnetism when desired.

Fast cycling and long life are distinct advantages in the NEUTROFIER. Models for every application; single and multiple units available with remote control station or automatic cycling relays.

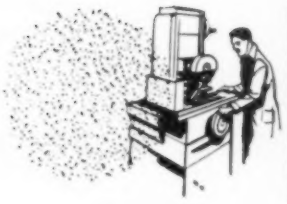
For Electric Motor Driven Units

also
ELECTRO-MATIC RECTIFIER
NEUTROL
NEUTROLATOR
RESIDUMETER
ELECTRO-MATIC DEMAGNETIZER

ELECTRO-MATIC PRODUCTS CO.
2235-37 N. Knox Ave. • Chicago 39, Illinois

Use postpaid card. Circle No. 224

(See Number 34)



Equipment and Materials

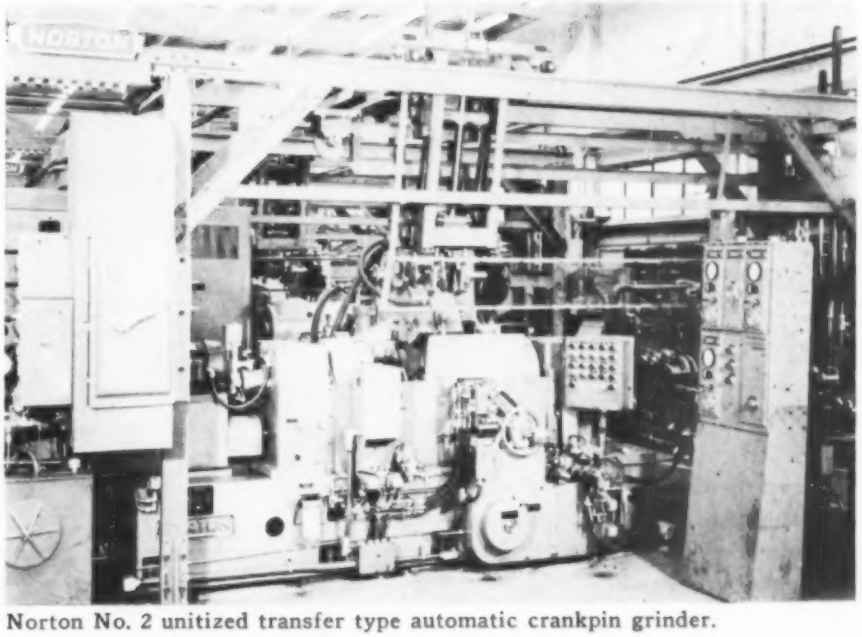
7-Station Crankpin Grinder Requires Little Operator Attention

A seven-station crankpin grinder, believed to be the largest and most expensive grinding machine ever built, known as the Norton No. 2 unitized transfer type automatic crankpin grinding machine was designed to finish grind the pins on up to 60 automotive type crankshafts per hour under completely automatic operating conditions. It is 19′ wide and 90′ long. When loaded on railroad cars for shipment, it will tip the scales at 135 tons. The price tag is in the neighborhood of $¾ million.

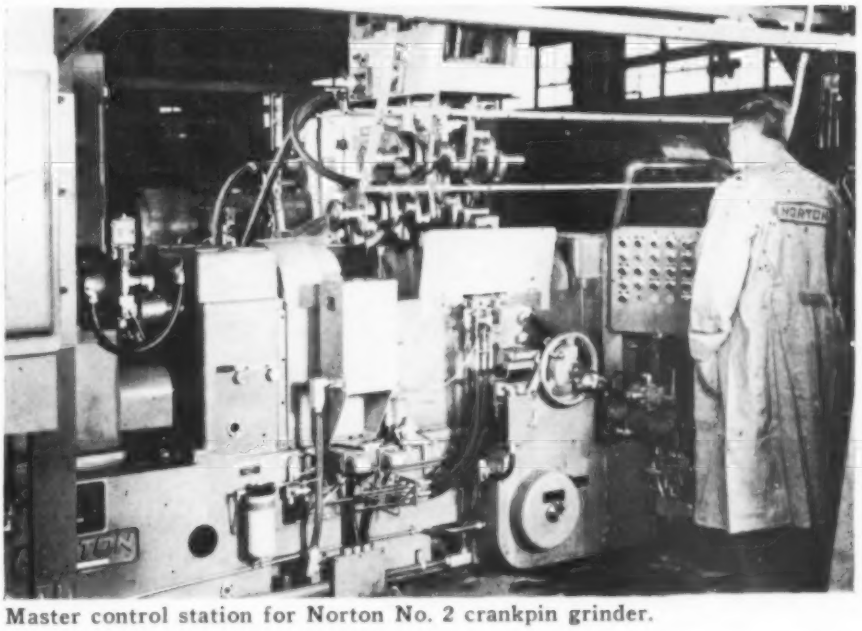
The grinder consists of seven grinding stations connected by a transfer system. All grinding, loading, unloading, size control, gaging and wheel truing is done automatically. An operator is required only to make adjustments and to take corrective steps if the lights on the control panel indicate trouble.

Manual lifting is entirely eliminated as an overhead transfer carriage, at right angles to the conveyor, brings the cranks from the conveyor to the grinding position. While grinding is in progress, the overhead carriage returns the ground crank to a position over the conveyor, picks up another unground crank, deposits the ground crank on the conveyor, and transfers the unground crank to a waiting position over the grinding station ready to be lowered at the next cycle.

During the 17 seconds that the wheel is not in contact with the work, the truing process takes place. Automatic truing devices true the face of the wheel and form the proper fillet radii on the corners of the wheel. This machine accurately locates the work angularly to within .002″ of the exact position. Angular location and axial location are accomplished precisely. After proper alignment, the locator retracts, the crank is clamped and the grinding cycle begins.



Norton No. 2 unitized transfer type automatic crankpin grinder.



Master control station for Norton No. 2 crankpin grinder.

At the end of the grinding cycle, the headstock drive is so controlled that the work holding blocks are brought to a correct stopped position to discharge and receive the cranks.

The machine is designed to mount

POSITIVE FILTRATION

(TO 1/2 MICRON) FOR AS LITTLE AS

.00015¢ PER GALLON!

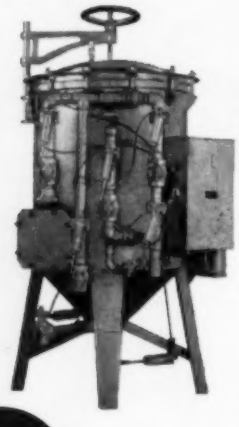
AND IT'S COMPLETELY AUTOMATIC!

Now, from Olson, a new dimension in industrial filtration — the first completely automatic, pressure-type filter! Every cycle — precoat, run, backwash—is automatically controlled. Injection of filter-aid (when used) and sludge carry-out are also automatic.

Maintenance is virtually eliminated in this trouble-free system. No parts to change, no elements to replace, and most important, *no costly downtime for cleaning!*

In large central systems, or with individual machines, Olson Filters guarantee over 96% purification of all types of coolants, cutting oils, quenching oils, cleaning and washing solutions and other industrial solvents at the lowest cost per gallon.

By the way, what are *your* costs per gallon? Why not check and see? Then call Olson.



The new Olson Industrial Filter is available in 8 standard models, from 10 gpm to 600 gpm capacities.

Write for free catalog on the new Olson automatic pressure-type filter.

OLSON FILTRATION ENGINEERS
Division of The American Laundry Machinery Company
DEPT G, CINCINNATI 12, OHIO

Use postpaid card. Circle No. 226

NEW EQUIPMENT *continued*

42" grinding wheels. The grinding cycle consists of a rapid infeed, fast rate for shoulder grinding, slower feed for roughing followed by a four-second dwell, and a very slow infeed for final sizing and finishing of the pin.

Post-process gaging is done on the ground crankpin when it returns to the conveyor.

Each station has independent controls for use in setting up and making adjustments. One switch changes the station from independent operation to automatic operation controlled from a central master control panel.

The seventh station, a standard Norton semi-automatic crankpin grinder (actually an extra station), can be adapted to single pin grinding and is equipped with a transfer mechanism. It will be used as a substitute for any of the other stations which may be shut down for wheel changing, adjustment or maintenance.

The customer for whom this crankpin grinder was built feels confident he will realize savings in direct labor and that the end product will be superior to what he has previously realized.

Norton Co., 1 New Bond St., Worcester 6, Mass.

Use postpaid card. Circle No. 38

Remote Exhaust Reduces Hazards With Portable Pneumatic Grinding

The pneumatic die grinder here is being used to modify a cage casting for a special assembly. The air is discharged at a point where the outer hose ends, several feet away.

A remote exhaust feature was provided in the manufacturer's new pneumatic die grinders because their motors are throttled by controlling the exhaust rather than the inlet. This provides full flow to the inlet at all times, with minimum pressure drop.

Elimination of flying metal chips, prevention of discharge of oil mist on the operator's hands and clothes, and reduction of sound are some of the advantages offered for the operator's safety.

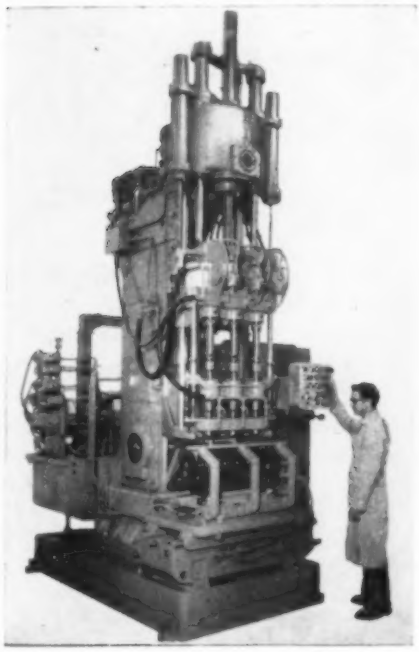
Thomas C. Wilson, Inc., Long Island City 1, N. Y.

Use postpaid card. Circle No. 39

Improved Hone Feed on Multi-Spindle Honing Machine

The BarnesdriL Model No. 4014 three-spindle vertical type honing machine features individually controlled pneumatic hone feed for each spindle. The improved design allows hone feed pressure calibration for each spindle to compensate for varying operating conditions caused by bore size irregularities and different degrees of stock hardness. The results reported are shorter cycle time, improved bore conditions and reduced stone wear.

Taper and out-of-round bore conditions are said to be less pronounced and close bore size tolerances are maintained by proper control of hone feed pressure. This pressure control on the honing stones in each tool prevents rapid stone wear due to forced cutting induced by inter-tool pressure variances. With this system it is now possible to use coarser stones for faster stock removal and still hold a closer rms tolerance range, the company states.

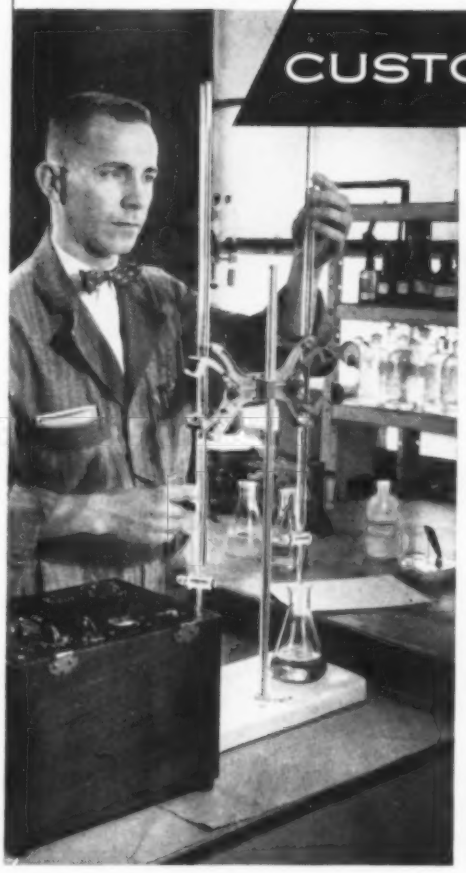


Production is reported at 32 blocks per hour at 80% efficiency. Finish requirements maintained are 25 to 35 rms.

Barnes Drill Co., 886 Chestnut St., Rockford, Ill.

Use postpaid card. Circle No. 40

consult the.... Roto-Finish CUSTOMER'S MAN



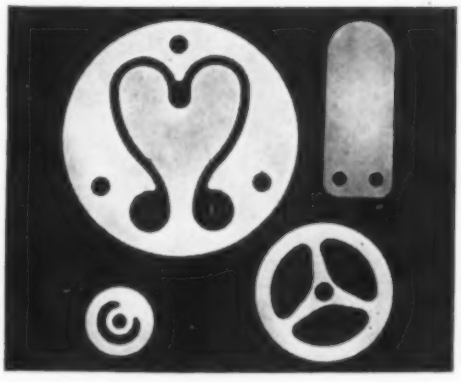
FOR FINISHING PLUS+

RESEARCH AND TECHNICAL ASSISTANCE

Faced with the problem of cutting down finishing costs with no sacrifice in product quality, more and more production and management men are turning to Roto-Finish for complete finishing *service*.

In the Roto-Finish Laboratory, technicians analyze your problem to determine the process which provides the desired finish at minimum cost. Often, it is necessary *to develop a new compound* to meet a specific need.

Test runs are then made in the Roto-Finish Processing Department under production conditions. If desired, your local Roto-Finish Customer's Man will run these tests in your own plant; so that you can check the results at first hand, results like this...



Roto-Finish CASE HISTORY

PART: Refrigeration compressor flapper valves. • MATERIAL: Swedish steel. OPERATIONS PERFORMED: Deburr. Generate full radii on all edges. Remove stress risers. • RESULT: Fatigue resistance increased 500%.

ROTO FINISH®

Roto-Finish COMPANY

3730 MILHAM ROAD
KALAMAZOO, MICHIGAN
Phone: Fireside 3-5678

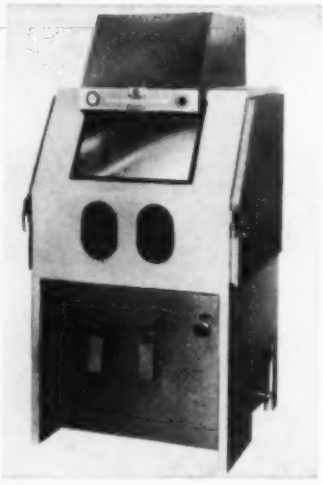
FOREIGN REPRESENTATIVES: ARGENTINA—Taller—Buenos Aires ● AUSTRALIA—A. Flavell Ltd.—Cheltenham ● BRAZIL—Commercial E. Industrial de Fornos Werco, Ltd.—Rio de Janeiro ● CANADA—Canadian Hanson & Van Winkle Co., Ltd.—Toronto ● ENGLAND—Roto-Finish Ltd.—Hemel Hempstead ● FRANCE—Societe Roto-Finish—Paris ● GERMANY, AUSTRIA, NORWAY, SWEDEN, SWITZERLAND—Metallgesellschaft A. G.—Frankfurt, a. M.—Germany ● HOLLAND, BELGIUM, LUXEMBURG—N. V. Roto Finish Maatschappij—Delft, Holland ● ITALY—Societa Roto-Finish a R. L.—Milan ● SPAIN—Instituto Electroquimico, S. A.—Barcelona

Use postpaid card. Circle No. 225

Glass-Jet Peening Machine

The Model A-50 machine, for use in a new process of glass-jet peening, uses specially-treated minute pure glass beads in a slurry solution. This process is reported to increase strength and fatigue life of metals, and improve finishes down to 4mu rms without ordinarily requiring masking. Extremely delicate parts may be peened without altering critical dimensions.

Operation is by a knee lever for manual freedom. Holes in doors on each side of the working chamber permit peening long or bulky pieces. The firm can adapt the machine for semi-automatic production, or any automation



set-up.

Perfecto-Peen, Div. of Aero-Test Equipment Co., P. O. Box 10627, Dallas 7, Texas.

Use postpaid card. Circle No. 41

All-Angle Pocket Pen-Light Inspection Mirror

This all-angle ball joint inspection mirror-flashlight combination is useful for inspection of small, hard-to-see areas.

Model E-501 is a combination circular 1¼" diameter mirror mounted on a pen-size flashlight. Over-all length is 7½". Priced at $35.40 per dozen. Model

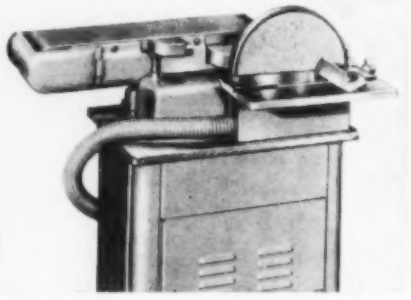
E-502 is the mirror attachment only. The 1¼" diameter circular is mounted on a slit sleeve designed to fit most any pen-size flashlight. Priced at $23.40 per dozen.

Ullman Devices Corp., Ridgefield, Conn.

Use postpaid card. Circle No. 42

Belt and Disc Sander

Heavy duty 10" disc and 6" x 48" belt sander features disc which can be operated with or without auxiliary work table and belt which operates in either vertical or horizontal positions. This large table with a mitre gauge can be



tilted 45° and is interchangeable for use with either belt or disc.

A pre-loading belt tensioning device permits fast changing of belts. Forward end guard can be opened so that the end of the drum may be used for sanding curved objects.

Duro Metal Products Co., 2651 N. Kildare, Chicago 39, Illinois.

Use postpaid card. Circle No. 43

Variable Density Cylindrical Grinding Wheels

As grinding wheels wear down, the constantly smaller diameter creates two changes in grinding action—the surface feet per minute gradually becomes lower, and the arc of contact between the wheel and work gradually becomes smaller. The Waltham variable density cylindrical grinding wheel is reported to automatically compensate for these ordinary wheel conditions, with uni-

Here's how TRUSSBILT . . . opened the door to improved quality in metal finishing operations

The TRUSSBILT DIV. of Siems Bros., Inc., St. Paul, Minn. . . . a leading manufacturer of flush steel doors used throughout the world; recently installed a tandem set-up of Timesaver "Speedbelt" Sanders in their steel door finishing line. Using a Model TOP and Model SPL, both face sheets of the doors are given a rough finish on the first pass through the line.

Low spots are then filled and doors are put through the line a second time for finishing. This provides a tremendous production advantage over previous hand operated methods, while eliminating variations in finish quality. The Timesaver line can handle approx. 100 doors an hour. This high speed finishing operation precedes dipping and baking operations, efficiently removing weld blemishes, while lowering high spots and smoothing out filled in valleys.

TRUSSBILT's experience is typical of Timesaver "Speedbelt" installations throughout the country . . . where the needs for better quality, better production and lower units costs is important. You, too, can enjoy the advantages of wide abrasive belt finishing and polishing in your shop at a minimum of cost. Investigate the advantages of Timesaver "Speedbelt" Sanders for your metal finishing and polishing operations, now!

TIMESAVER SANDERS

Dept. R-2
Box 7446 • Robbinsdale Station
Minneapolis 22, Minn.

Write Today . . .

Send for literature and prices . . . or request an analysis of your finishing problem. No obligation.

Use postpaid card. Circle No. 227

form action all the way to the flanges.

The wheels are made from 16" through 36" as operations require.

Waltham Grinding Wheel Co., Waltham, Mass.

Use postpaid card. Circle No. 44

Barrel Finisher Provides Any Barrel Speed For Any Material

The horizontal Finishmaster features variable speed motor drive for any barrel speed to finish any material, it is claimed. Another advantage is that of safe operation as the brake motor holds barrel position, and the limit switch permits jogging but not running with raised guard. Barrel emp-

ties completely and is easily loaded and unloaded.

Standard equipment includes automatic timer, automatic pressure relief valve in cover, and barrel speed controls.

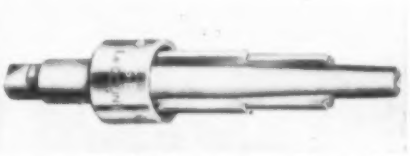
The compact unit occupies only 5'x 5' floor space, and can be placed side by side.

The Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.

Use postpaid card. Circle No. 45

Straight Jaw Mandrels

A new type GB wide range, straight jaw mandrel needs only 14 tools for a range of ⅜" to 3¼" diameters. These internal-chuck mandrels, with a tolerance of .001" t.i.r., round out the firm's mandrel line which also includes regulars guaranteed .0005" t.i.r. and supers

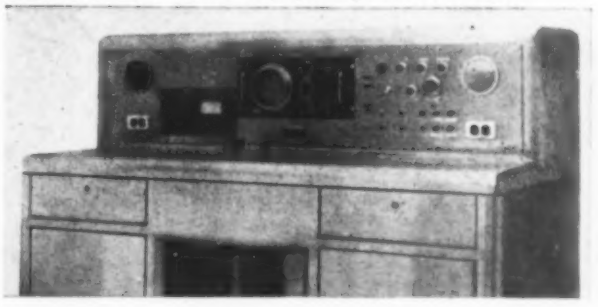


guaranteed .0002" t.i.r. throughout their wide ranges.

Le Count Tool Works, Inc., 38 Cody St., W. Hartford 10, Conn.

Use postpaid card. Circle No. 46

Tester Locates Bearing Faults Down to 1/1,000,000" in Size



Model BA-22 claims to detect and pinpoint hidden faults one-millionth of an inch in size, without bearing dis-assembly. Bearings may be tested with or without grease, oil, or seals, and new bearings need not be cleaned before testing.

Oscilloscope display combined with audible signal and simple dial settings make possible reliable operation of the instrument by untrained personnel. Radial or thrust-type bearings may be tested under load conditions in either the vertical or horizontal plain. Ball and roller bearings up to 14" in diameter are checked with accuracy.

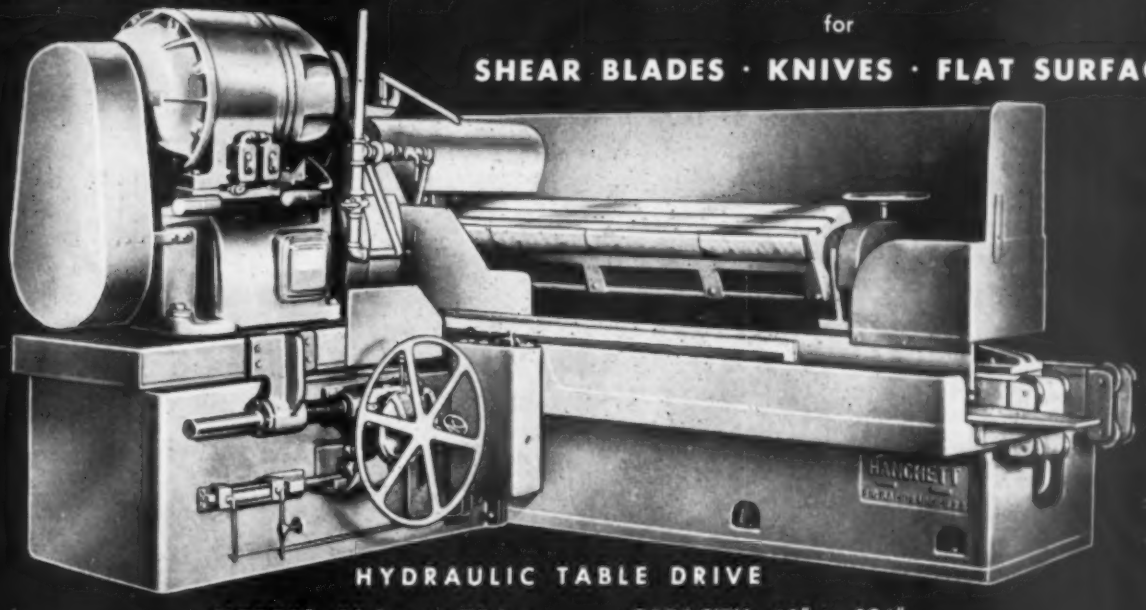
Bearing Inspection Inc., 3311 E. Gage Ave., Huntington Park, Calif.

Use postpaid card. Circle No. 47

HANCHETT new HY-POWER grinder

for

SHEAR BLADES · KNIVES · FLAT SURFACES



HYDRAULIC TABLE DRIVE

MOTORS: 30 h.p. to 75 h.p. CAPACITY: 60" to 296"

GRINDING WHEELS: 30" or 36" diameter segmental

FULL AUTOMATIC CONTROLS • POWERFUL • ACCURATE

HANCHETT MANUFACTURING COMPANY

World's Largest Manufacturer of Knife Grinding and Saw Sharpening Machinery

MAIN OFFICE — Big Rapids, Michigan WEST COAST - Portland 1, Oregon

HANCHETT GRINDERS BIG RAPIDS MICHIGAN

Use postpaid card. Circle No. 228

● ACTUAL MANUFACTURERS OF RESINOID METAL AND VITRIFIED DIAMOND WHEELS UP TO AND INCLUDING 20" DIAMETERS

Call or write for literature today!

THE PAUL L. KUZMICK COMPANY
271-279 GROVE AVE.
VERONA, N.J.

● MANUFACTURERS OF RESINOID AND RUBBER BONDED WHEELS SERVING THE AIRCRAFT, CUTLERY AND STEEL FABRICATING INDUSTRIES.

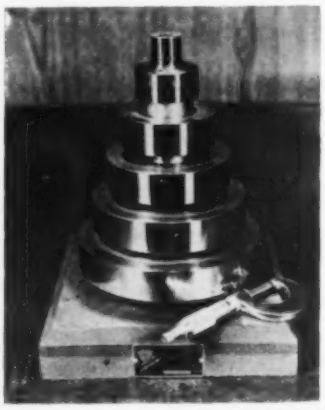
Call or write for literature today

PEKAY ABRASIVES, INC.
271 GROVE AVE.
VERONA, N.J.

Use postpaid card. Circle No. 229

3 New Models of Mikemasters

The Mikemaster, in three new models, enables the inspector to check his mikes, and other OD measuring tools,



frequently to assure accuracy of their readings.

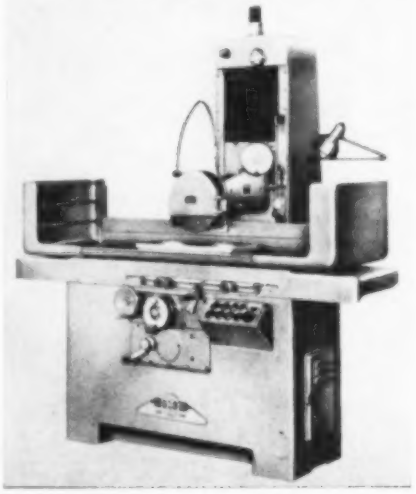
Model M-1 is in even inch steps, from 1" to 6". Model M 1½ is made in steps of ½", with a range of ½" to 6½", so that mikes may be checked in the range in which they receive the most wear. Model M-2 is used to check the 0-1" instruments, in steps of .100".

Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill.

Use postpaid card. Circle No. 48

High Output Surface Grinder Features Automatic Sizing

The ELB surface grinder, made in Germany, offers automatic sizing for fully automatic downfeed and automatic cycle control. The required final size



is only set once and is then maintained during grinding without further measuring. There is rapid traverse approach until the wheel touches the workpiece, and automatic rapid return to preset starting position, independent of wheel wear and diameter of grinding wheel.

The sizing attachment can be supplied with automatic cycle control for economy in batch production—control of slides, swiveling of fixtures, also in transfer lines.

Racks are profile ground with the built-on wheel crushing attachment.

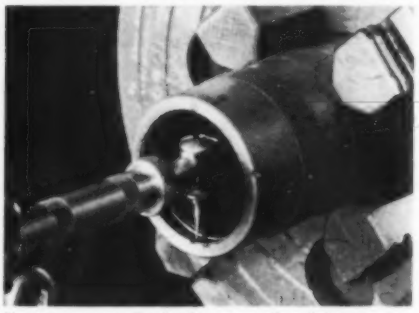
Shaped workpieces up to 20" wide can be copy ground automatically from a template.

Aaron Machinery Co. Inc., 45 Crosby St., New York 12, N.Y.

Use postpaid card. Circle No. 49

Cutting, Grinding Instrument Operates at 300,000 RPM

The Airotor, an air driven cutting and grinding instrument, operates at spindle speeds in excess of 300,000 rpm, grinding holes as small as .025" to tolerances of ±.0001". It will machine extremely hard materials, such as ceramics, glass, carbides, and hard metals



Instrument is being used with a vertical milling machine, producing 1/16" keyway in 62 R.C. hardened tool steel.

with diamond and carbide tools at great efficiency.

A control unit, provided with the instrument, regulates and filters incoming air. Air flow is manually controlled. No electrical connections are required, although an electric remote control switch is available if desired.

An accessory grinding adapter, for use with an offset boring bar, permits the instrument itself to rotate about the axis of the machine spindle.

The Ashcombe Co., 1320 W. Market St., York 47, Pa.

Use postpaid card. Circle No. 50

Two Precision Grinding Vises

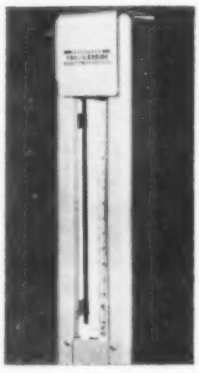
The new No. 11 Palmgren grinding vise has 1½" jaw width, and opens 1½". The No. 22 vise has 2½" jaw width,

and opens 2½". Both are reported to be accurately ground to .0005" on top, bottom, end, and sides, and are made of high grade grey iron.

Palmgren Steel Products, 8383 S. Chicago Ave., Chicago 17, Ill.

Use postpaid card. Circle No. 51

Long-Range Air Gage Triples Gaging Range



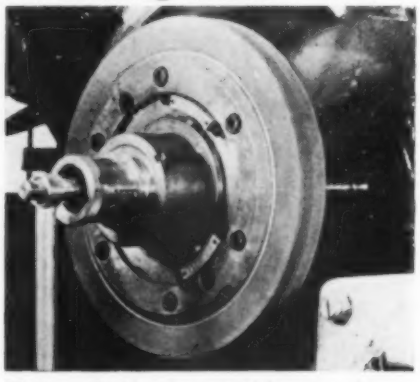
The Model 1500 Series long-range Precisionaire air gage has a full 15" linear column and scale with amplifications up to 100,000 to 1. Single column instruments with standard amplification of 5000 to 1, or 10,000 to 1, are available for immediate delivery. A super-amplification kit for use with the 10,000 to 1 instrument provides amplifications of 20,000 to 1, 40M, 50M, 80M, and 100,000 to 1 without changing the glass column.

At 5000 to 1 amplification, the long-range unit has an inspection range of .003 with scale graduations in 50 millionths, and at 100,000 to 1 amplification, the range is .00015 with 2 millionths graduations.

The Sheffield Corp., Dayton 1, Ohio.

Use postpaid card. Circle No. 52

Precision Balancer For Grinding Wheels



Hub and wheel assembly are shown in "test" balance position. Accurate balancing of the wheel follows in minutes by adjustment of the three weights (two shown here) inserted in the hub.

Portable balancers for internal, external, centerless and center grinding machines offer fast, accurate balancing of grinding wheels without removing the wheel from the grinder. The balancer is reported to achieve precision balance and return the machine to production in less than 30 minutes.

Once the hub and wheel are in position, accurate balancing of the wheel is achieved in minutes by use of a set of three adjustable weights inserted in the hub. Vibration tests reported repeated accuracy within .000040" displacement (concentricity).

Aero Supply Mfg. Co., Inc., Corry, Pa.

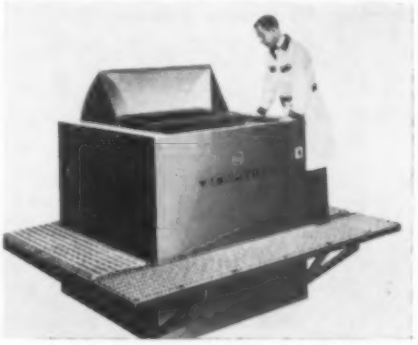
Use postpaid card. Circle No. 53

Finishing Machine Uses Very Little Compound

The Vibratron, a newly developed machine for mass production cleaning, descaling, deburring, radiusing, fine finishing, and coloring of metal parts, conveniently finishes complex cast, forged, stamped, and machined parts with shielded and internal surfaces. Only a few ounces of compound are necessary to do an effective job. Work zone extends throughout the entire abrasive mass.

Push button controls are featured, also an accoustical housing which reduces noise level to a hum.

The machine is offered in a variety of sizes to meet varied production requirements. There are four options for each size.



Roto-Finish Co., 3715 Milham Rd., Kalamazoo, Mich.

Use postpaid card. Circle No. 54

How to make both ends meet . . . and still cut finishing costs!

Time was when abrasive belt joints raised a rough problem in finishing circles. The early overlapping joints caused belts to rotate unevenly, chatter and mar freshly finished surfaces. Not so now! Today, Jewel Brand "Velvet Joints" have put the "smooth" back in smoothing operations. Jewel Brand Belt ends are neatly blended to form velvet smooth joints which permit an even flow of cutting surfaces and eliminate jumping. The result is a smooth, uninterrupted action that speeds up grinding, finishing and polishing . . . helps keep product finishing costs in line. A Jewel Brand Engineer will be glad to demonstrate these superior belts in action in your plant without obligation. Arrange for a free demonstration now. Write Abrasive Products, Inc., 517 Pearl Street, South Braintree 85, Massachusetts.

belts
rolls
sheets
discs
specialties

JEWEL BRAND

COATED ABRASIVES

ABRASIVE PRODUCTS, INC., South Braintree 85, Massachusetts

Use postpaid card. Circle No. 230

Vernier Depth Gage Features Spring Pressure Clamp

This No. 601 vernier depth gage has a long vernier plate, 1.255", providing readings in .001", and having the vernier graduations flush with the blade graduations eliminating parallax. A spring pressure clamp holds the blade firmly in position.

The gage is available with 6", 12", and both 6" and 12" blades which provide readings over the full range of 6" and 12".

Brown & Sharpe Mfg. Co., Providence 1, R. I.

Use postpaid card. Circle No. 55

New Series Added to Portable Grinder Line

The 904 series of portable pneumatic grinders includes 6" heavy duty horizontal grinders, wire brushing machines, and horizontal buffers. A choice of three speeds is available in the grinders and wire brushing machines—9 thousand, 7.2 thousand, or 6 thousand rpm (free speeds). The choice of speeds for the horizontal buffers is either 9 or 6 thousand rpm.

Wire brushing machine.

As in the case of other series in the recently introduced grinder line, either lever, straight, or grip-type handles may be specified.

Thomas C. Wilson, Inc., 21-11 44th Ave., Long Island City 1, N.Y.

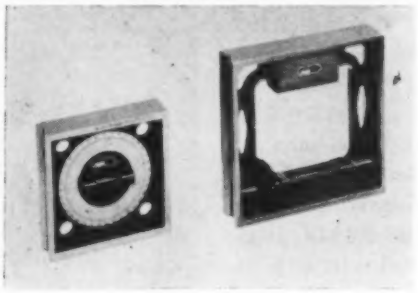
Use postpaid card. Circle No. 56

Leveling Squares

Wyler leveling squares of Swiss precision make are available in two types.

The solid square, which is mostly recommended for checking squareness between machine members, is available in three degrees of sensitivity: three, five and ten seconds of arc to meet any reasonable requirement.

The other square, which is really a simplified and inexpensive Clino-Meter,



has a range of 0-180-0 degrees with vernier reading in six minutes of arc. The inherent accuracy is 30 seconds of arc.

Opto-Metric Tools, Inc., 137 Varick St., New York 13, N.Y.

Use postpaid card. Circle No. 57

Ammeter Mounted on Polisher Shows Motor Load at Glance

A Junior flat polisher, designed to grind, polish and deburr flat surfaces of material with cross sections up to 12" by 4", will handle material in coil, sheets, bars, blanks, manufactured or cast parts. It uses an abrasive belt for either wet or dry operation. The units may be arranged in tandem to perform consecutive polishing operations, and are available in models which can be

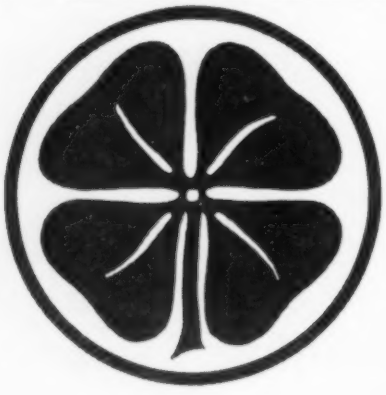
fed by conveyor, pinch rolls, or coiling equipment.

Continuous, 111" long abrasive belts in widths from 6" to 12" can be used. A hand wheel provides quick adjustment for changes in work thickness.

An ammeter, mounted for easy viewing, shows the operator the motor load at a glance. The neoprene contact roll can be dressed right in the machine at operating speeds.

Murray-Way Corp., Box 180, Maple Road East, Birmingham, Mich.

Use postpaid card. Circle No. 58



There's more than luck to
CLOVER COATED ABRASIVES . . .

The man who has used Clover Abrasives for years is apt to believe in luck. *He is lucky* that he has been introduced to Clover products. But that kind of good fortune is built in when the product is made. Part of it rests in our discriminating choice of the best materials available; the other part in the care real craftsmen use in making a tool.

Fifty-odd years of experience have proven many times that Clover Coated Abrasives are a lucky choice because they are made for hard service. Ask your Clover Distributor for samples or for a new Clover Catalog, or write us direct. You owe it to yourself to see the Clover line.

Clover Manufacturing Company

Norwalk, Connecticut

Victor 7-4515

Since 1903

Makers of the famous
CLOVER Grinding and Lapping **COMPOUNDS**

Use postpaid card. Circle No. 231

Grinding and Finishing

AUGUST, 1959
READER SERVICE CARD

Tear out and mail this card!

Please have information sent me on all items I have encircled.

Your Name ..... Title.....

Company .....

Address .....

City ..... Zone..... State.....

Products Manufactured .....

ADVERTISEMENTS

201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EQUIPMENT & LITERATURE ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What article in this issue interested you most?_____

What subjects would you like to see published in future issues? _____

These Reader Service Cards are for your convenience. They will assist you in getting the additional information you require about any editorial item or advertisement. Because of the speed with which thousands of cards are processed each month it is essential that the blanks be filled in accurately and completely. This will save time and speed the information to you.

Please use only one Reader Service card and let one of your colleagues use the other.

Grinding and Finishing

AUGUST, 1959
READER SERVICE CARD

Tear out and mail this card!

Please have information sent me on all items I have encircled.

Your Name ..... Title.....

Company .....

Address .....

City ..... Zone..... State.....

Products Manufactured .....

ADVERTISEMENTS

201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EQUIPMENT & LITERATURE ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What article in this issue interested you most?_____

What subjects would you like to see published in future issues? _____

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

GRINDING and FINISHING
A Hitchcock Publication
WHEATON, ILLINOIS

USE THESE HANDY POSTAGE PAID CARDS FOR HELPFUL INFORMATION AND LITERATURE

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

GRINDING and FINISHING
A Hitchcock Publication
WHEATON, ILLINOIS

Roll Barrel System Processes A Variety of Parts

A precision deburring and finishing system, called Roll Barrels, is designed for processing a variety of parts in small or large lots. The barrels provide a large capacity operation in an unusually small floor area. Using two machines, one operator can continuously process up to 12 different barrels full of parts at the same time.

Roll barrel machines use an open system of parallel rubber covered rollers powered by a variable speed electric motor. Small barrels with flanges are simply placed on, and then rotated by the powered rubber rollers. Barrel rotation speed is determined by motor speed and size of barrel. Nine barrel sizes are available and barrel speeds of 17 to 65 rpm are obtained.

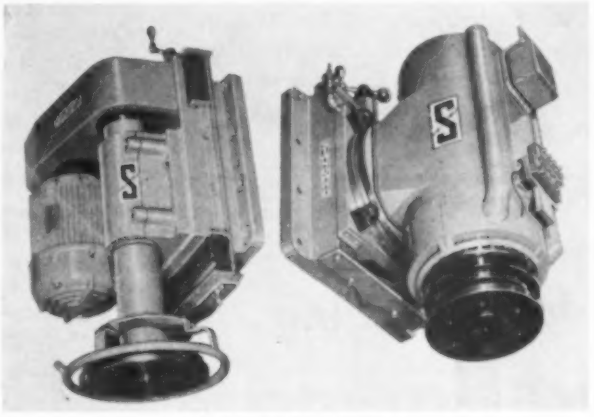
The machines are available as single row or double row units depending on floor space requirements.

Almco, Queen Products Div., King-Seeley Corp., Albert Lea, Minn.

Use postpaid card. Circle No. 59

Machining Hard Metals With Super Precision Spindles

Versatile variations in design, sizes, arrangement, components and accessories of precision spindles for machining hard space age metals are shown in part in the illustration. Horsepower and speed requirements will vary from 1 hp to 20 hp, 600 rpm to 7600 rpm, depending upon the character of work, size and type of wheel, etc. In some instances, multiple speed on direct motor driven, or variable speed on belted motor drive delivers versatility needed.



The No. 2000RLY precision spindle at the left is equipped with a 5 hp, 1800 rpm AC motor, accommodating 6", 8", 10", 12", and 14" straight or cup grinding wheels.

The No. 6028LY at the right offers four speeds of 3600, 1800, 1200 and 600 rpm. Wheel sizes for this unit range from 6" to 18" dia. cup wheels and 14" to 20" dia. straight wheels.

The Standard Electrical Tool Co., 2488-96 River Rd., Cincinnati 4, Ohio.

Use postpaid card. Circle No. 60

Segmental Wheels Provide Improved Surface Finish

The MM Process abrasive wheels and segmental wheels were developed to increase production on the grinding of carbides, cast iron, and hard-to-grind steels.

The process involves the uniform, loose dispersion of fine abrasive pellets throughout the matrix of the wheel. The pellets function as a cooling element, and release a flow of loose abrasive between wheel and work, which results in an increased rate of stock removal and improved surface finish.

Macklin Co., 2917 Wildwood Rd., Jackson, Mich.

Use postpaid card. Circle No. 61

SEND FOR CATALOG

NAME

TITLE

COMPANY

STREET

CITY/STATE

RAISE GRINDING PRODUCTION

FOR $2.70

A typical Desmond Huntington grinding wheel dresser costs about $2.70 from your distributor, yet it substantially increases grinding production, makes wheels cut better, and lowers grinding costs. By dressing all your grinding wheels regularly you remove inefficient dull particles and loaded metal, expose a fresh new grinding surface. Your Desmond distributor can furnish the exact model you require. Ask his advice.

The only complete line of grinding wheel dressers and cutters

Desmond

The Desmond-Stephan Mfg. Co.
Urbana, Ohio

Use postpaid card. Circle No. 232

NEW EQUIPMENT *continued*

Miniature Laps for Holes 1/16" to 11/64"

Eight smaller sizes have been added to the manufacturer's line of helical-slot round hole laps. These miniature laps are designed to lap holes 1/16" to 11/64", in increments of 64ths, with or without interruptions. Special decimal in-between diameters are also available.

These laps are fine grain lap iron with helical slot, allowing uniform expansion on the entire length, which is reported to give faster lapping action and longer lap life.

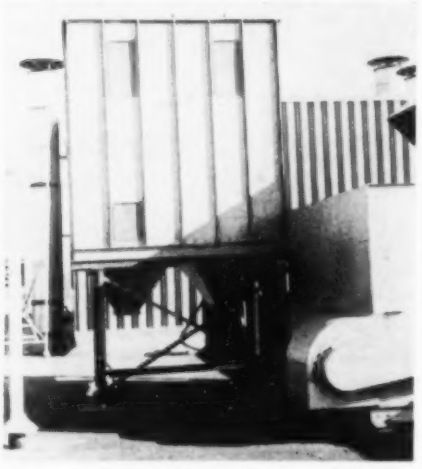
Prices include: laps, 1/16, 5/64, $.95; 3/32, 7/64, $.85; 1/8, 9/64, 5/32, 11/64, $.75; corresponding arbors, $2.60; $2.50, and $2.35.

American Lap Co., 20184 Sherwood, Detroit 34, Mich.

Use postpaid card. Circle No. 62

Cloth Tube Filter House for Large Volume Air Filtration

The Filterkop illustrated is designed as a solution to large volume air filtration and recirculation problems. All the air that has been pre-cleaned by standard Dustkop cyclone separators is carried into a large single pipe leading to



the cloth tube filter house on the roof. Here the final separation takes place. Thoroughly cleaned air passes through another large pipe back into the plant.

Installations make possible the filtration of air carrying almost every type of dust, it is reported, and the recirculation of air volumes up through 10,000 CFM.

Aget Manufacturing Co., 1408 E. Church St., Adrian, Mich.

Use postpaid card. Circle No. 63

Measuring Instrument for Internal Grooves & Blind Holes

A new Quicktest line of precision dial measuring instruments has contacting feeler points especially engineered for determining the diameter of internal grooves in difficult-to-measure situations.

One leg of the measuring instrument

is rigid and the other is movable. The distance between extremities of the feelers is recorded directly on a finely graduated dial.

The instruments measure diameters of internal grooves from .4" to 4.0". Each individual model has a range of .4". The dial has a diameter of 2⅛" for easy reading.

Testing Machines, Inc., 72 Jericho Turnpike, Mineola, L.I., N.Y.

Use postpaid card. Circle No. 64

Work Checked By Projector Without Removal From Machine

A machine tool projector, Model No. 7000, allows great control and fast operation applied to grinding operations, by means of a bright, high contrast enlarged screen image of work contours. The projector consists of a 6" dia. ground glass screen, interchangeable optical systems and suitable collimated light sources for either horizontal or vertical projections.

Attachable to most cutter, tool or surface grinders, the projector allows the operator to check or compare his

Modern Short-Cut to Better, Faster Product Finishing...

VAPOR BLAST* Liquid Honing*

Here's ONE machine that can replace many product finishing operations in your plant—soaking, washing, cleaning, degreasing, pickling, descaling, deburring and other time-consuming tasks—at much lower cost!

VAPOR BLAST LIQUID HONING*, the *original* Wet Blast Process of surface finishing, uses fine abrasive powders (40 to 5000 mesh) suspended in a chemical solution and forced at high velocity through special nozzles against the parts to be treated. Its applications are practically unlimited! Write for details or send sample parts for free laboratory processing.

Vapor Blast and Liquid Honing are Trademarks.

VAPOR V-B BLAST

VAPOR BLAST MFG. CO.
3126-A W. ATKINSON AVENUE
MILWAUEE 16, WISCONSIN

VB Liquid Honing Machine in Standard sizes or Custom-Built, manual or Automatic.

Use postpaid card. Circle No. 233

work directly to predetermined tolerances without removing the work from the machine or disturbing the work set-up.

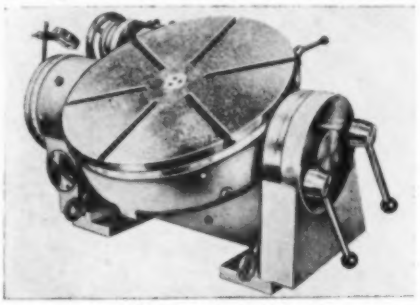
Angles are read directly by means of a vernier protractor ring-screen accessory. Direct comparison of contours is possible by means of transparent overlay charts.

Stocker & Yale, Inc., Marblehead, Mass.

Use postpaid card. Circle No. 65

Inclinable Tables in 6 Sizes from 10"-32" Dia.

A line of high precision inclinable tables, imported from West Germany, is available in six sizes, ranging from 10" to 32" dia. These tables are well suited for jig boring, assembly and inspection operations. They read in one or two seconds respectively, with an indexing accuracy of 10 seconds of arc. A certificate



of proof in 5° intervals is furnished with each table.

Opto-Metric Tools, Inc., 137 Varick St., New York 13, N. Y.

Use postpaid card. Circle No. 66

Barrel Finishing Unit Has Work & Compound Separation

The Model XL-1415 barrel finishing unit is designed especially for the ball burnishing of jewelry parts, deburring of small metal stampings and castings, and deflashing of plastic parts either wet or dry process.

The hexagonal barrel is 14" in diameter, 15" long. Driven by a ¼ hp motor, barrel speed is adjustable from 15 to 45 rpm. The unit also incorporates a caster-mounted work and compound separation system.

Tumb-L-Matic, Inc., St. Mary's St., Stamford, Conn.

Use postpaid card. Circle No. 67

Light Source Unit Used With 14", 30" Screen Comparators

Photo shows sharpness of shadow image of part at 270 magnifications. The gear has 57 teeth, and has 1.1159" dia. base circle.

Mercury arc lamp light source unit, designed for use with all J&L 14" screen and 30" screen optical comparators, is said to provide great intensity. The high-intensity magnification produces an extremely bright and sharp shadow image.

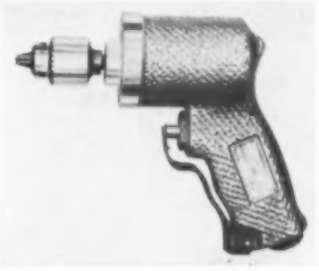
A system of interlocking limit switches safeguards the unit. It is self-cooling.

Jones & Lamson Machine Co., 522 Clinton St., Springfield, Vt.

Use postpaid card. Circle No. 68

Dual Air Sander-Drill Has Finger-Tip Speed Control

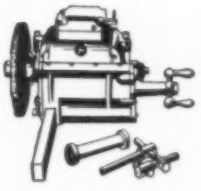
Operated as a sander, the air-operated Dual Purpose uses standard 4"



discs or buffers for automotive body sanding, sheet metal buffing, deburring, and light weld scaling. Used as a drill, the unit takes any standard drills up to ¼" and is recommended for light sheet metal, galvanized, aluminum sheet or tubing.

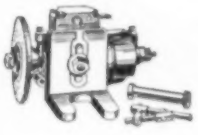
The metering trigger enables the operator to control blows per minute

• for FASTER . . . EASIER . . . MORE ECONOMICAL GRINDING
EASILY MOUNTED FOR ALL SUPPLEMENTARY GRINDING



TOOL POST GRINDER

VERTICAL SPINDLE GRINDER



ANGLE PLATE GRINDER

PRECISION LATHE GRINDER

also special Motorized Spindles

GRINDING ATTACHMENTS

• *for lathes, planers, boring mills, milling machines, shapers, etc.*

For tool rooms and shops handling a wide variety and range of work from the simplest to the most complicated. For internal and external grinding, grinding centers, reamers, taps, dies, rolls, journals, crankshafts, cylindrical, surface or special purpose grinding. With or without horizontal or vertical feeds.

Write for catalogs

"Over 60 Years Service to Industry"

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

Use postpaid card. Circle No. 234

from 0 to 6000 rpm, which is desirable where slow speeds are needed.

Superior Pneumatic & Mfg., Inc., 13800 Enterprise Ave., Cleveland 35, Ohio.

Use postpaid card. Circle No. 69

Micrometer Has 3-Point Contact For Checking Out-of-Roundness

The No. 483 V-anvil micrometer has a three-point contact which quickly detects out-of-roundness and alerts the operator to the need for machine adjustment. Two-point measuring tools, checking diameter only, will pass the work. Readings are taken directly in thousandths from the micrometer thimble on this three-point tool.

This micrometer is also designed for measuring three-fluted cutting tools such as taps and milling cutters. A companion micrometer, No. 485, measures five-fluted cutters.

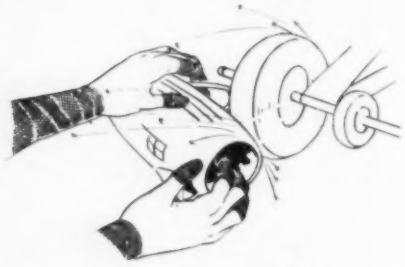
Illustration shows the micrometer checking centerless ground work for out-of-roundness.

The L. S. Starrett Co., Athol, Mass.

Use postpaid card. Circle No. 70

Self-Adhering Safety Tape

Guard-Tex, a green, safety-colored, self-adhering safety tape, is reported to



help reduce accidents and also save lost man-hours by protecting fingers, hands and forearms against cuts, burns and abrasions. Easy to apply and remove, the tape leaves no residue or stain.

General Bandages, Inc., 8300 Lehigh Ave., Morton Grove, Ill.

Use postpaid card. Circle No. 71

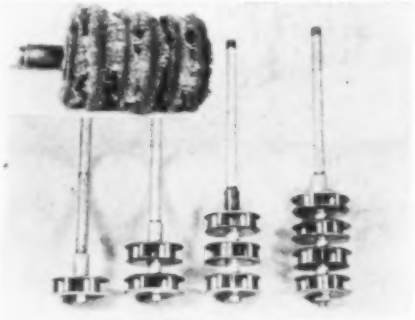
Magnetic Device Rids Particles From Hydraulic Reservoirs

The magnetic Kebby Tank-Trapper removes ferrous particles from the reservoirs of hydraulic equipment. This is in compliance with the new J.I.C. standards for hydraulic reservoirs, calling for magnets in all reservoirs.

The unit is designed to go through a 2" pipe plug opening. If desired, a 2" or 2½" pipe plug may be furnished. Eight standard sizes are offered, ranging from a single unit for 10 gallon reservoirs to multiple units for 350 gallon reservoirs.

The four models shown are to be used for 10, 30, 60, and 100 gallon capacity reservoirs. Smaller photo (upper left) demonstrates the device's magnetic power.

The Kebby Co., 2320 Custer Ave., Rockford, Ill.



Use postpaid card. Circle No. 72

Electrostatic Chucks Hold Any Metals, Even Non-Metallics

New electrostatic chucking equipment is said to be the first to achieve practical application of electrostatic rather than electro-magnetic force for chucking small parts.

Any electrical conductor such as aluminum, copper, bronze, brass, stainless steels and magnesium, as well as the ferrous metals, are reported to be held on this type of chuck with equal efficiency. The company also states that it is possible to chuck ceramics or plastics.

Basic equipment consists of the chuck itself, the power supply, the Dri-box, and the dielectric coolant unit.

Standard Electroforce chucks are designed for use with a 6"x18" or larger surface grinder.

Electroforce Inc., Fairfield, Conn.

Use postpaid card. Circle No. 73

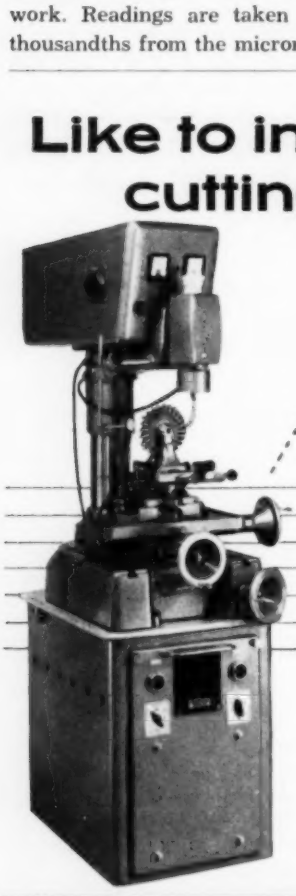
Protective Safety Specs

Protective safety specs, weighing only ¾ oz., offer featherweight protection from the danger of flying objects. They are recommended for semi-hazardous operations such as spot welding, buffing, woodworking, and handtool operations. Priced at $6.00 per dozen with clear or green lenses.

General Scientific Equipment Co., P.O. Box 3038, Philadelphia 50, Pa.

Use postpaid card. Circle No. 74

Like to increase your cutting tool life up to 400% ?



Examples of increased tool life

Turning Tool, Single Point	250%
Spot Facing Tool	200%
Slitting Saw, 60 Teeth	400%
Punch and Die	300%
Reamer, 6 Flutes	50%
End Mill, 2 Flutes	75%

Ask for 12 page bulletin "Sparcard"

Hardness and wear resistance of tungsten carbide are combined with toughness and resilience of high speed steel.

New Sparcard machine deposits and bonds carbide on tool surface by electrical discharge.

EASCO PRODUCTS P.O. BOX 587 YPSILANTI, MICH.

CANADIAN REP.....B.S.A. TOOLS LTD., TORONTO

Use postpaid card. Circle No. 235

American Society for Abrasives

Formation of Chicago Chapter

Introductory talk at this first Charter Meeting on June 11 was given by Chicago Chapter's President, Stanley E. Ziegler. President Ziegler welcomed the members and guests with a reading of the goals of the new Society as set forth in the pamphlet published by the National Board of Directors.

In order for the Chapter to grow, Ziegler stated that "the kernel of our growth must be educational. Bring us your apprentice grinder and we will teach him that a grinding wheel is not only a valuable tool of production, but also a lethal weapon that must be handled with respect. Bring us the old timer on the job and perhaps we can convince him that a two-carat diamond tool will do the wheel dressing job just as well as a four-carat diamond. Bring us your engineers, and your production foremen, burdened with the problems of grinding, snagging, buffing and polishing, and we will show them how an increase, or a decrease, in the rpm of a grinding wheel can affect its performance.

"Let us learn from these users of the products how best the industry can serve its customers, and let us help the abrasive industry to channel the millions of dollars spent on research and development into the products that will be of greatest help to the consumers.

"Let us invite into our Society our friends in allied fields—the machine tool manufacturers, the makers of the dressing tools and the gaging equipment, the suppliers of the grinding oils and coolants."

Members were encouraged to attend the meetings, participate in the activities and be willing to help when needed in order to build a dynamic Chicago Chapter.

Twelve new members were taken in at this meeting. The next get-together was tentatively planned for Sept. 26—a golf outing at Cog-Hill. The next regular meeting was scheduled for Oct. 8 at Nielsen's Restaurant on North Avenue, at 6 P.M.

By-laws as written by the Board on May 21 were read and approved at this first meeting.

CONNECTICUT CHAPTER—Shown above are new officers of the Chapter, and guest speaker, at the April 27 meeting. Left to right: Norman J. Brunette, Yacko Yarde, Robert G. Carpentier (out-going President), Kyle Rote (Captain, N.Y. Giants football team), Patrick J. Pascucci (incoming President), and Stanley J. Bozek.

Charter Granted to Delware Valley Chapter

National Headquarters of the American Society for Abrasives announced that a charter was granted to the Delaware Valley Chapter of the Society at Philadelphia and was presented at a meeting June 24 at the Willow Grove Moose Lodge. This is the twelfth chapter of the A.S.A.

Present officers of the Chapter are **David A. Boone**, Pres., and **Cornelius J. Hause**, Sec'y.

Connecticut Chapter—At its Annual Meeting, April 27, at Sun Valley Restaurant, Meriden, the Chapter elected officers as follows: **Patrick J. Pascucci**, Pres.; **Stanley J. Bozek**, Vice-Pres.; **Bert Broekhuysen**, Recording and Corres. Sec'y, and **Charles W. Sadler**, Treas.

Following induction of the new officers, the Chapter took preliminary steps toward the formation of a trust fund. Captain Kyle Rote, of the New York Giants football team, gave an interesting talk.

Tentative programs planned for fall meetings are as follows: Professor Milton C. Shaw, Massachusetts Institute of Technology, "Grinding Research"; Richard Malconian, Liberty Mutual Insurance Co., Boston, Mass., "Grinding

American Society for Abrasives . . .

Wheel Speeds and Liabilities," and G. O. Pfaff, Wheelabrator Corp., Mishawaka, Ind., "Selecting Blast Cleaning and Peening Abrasives." The next meeting will be held sometime in September.

Pittsburgh Chapter—The second Annual Spring Party for the Chapter was held on June 18 at the Mt. Lebanon Country Club. In attendance were 93 members and guests. Included in the program was golf, cocktails, dinner and prizes. After a short meeting, Mr. Beattie, the President, turned over proceedings to Mr. DeVilling, Party Chairman, who presented the prizes.

New Jersey Chapter—At its June 17 meeting at the Blue Shutter Inn, Union, N.J., the Chapter elected the following officers: **John A. Cornell,** Pres.; **William Wilkins,** Vice-Pres.; **William J. Yurecko,** Sec'y, and **William Deike,** Treas.

The program for the first fall meeting will be on internal grinding problems, presented by Mr. E. F. Hennis of Bryant Chucking Grinder Co.

Flint Chapter—This Flint (Mich.) Chapter closed out the 1958-59 program with a Golf Stag on June 6, which with the cooperation of the weatherman and the unceasing effort of the committee was a grand wind-up for an exceptionally successful first year. The first two 1959-60 meetings will be: "Buffing and Polishing," Formax Mfg., Howard J. McAleer, Pres., General Motors Institute, Flint, Sept. 16, and "Evolution in the Use of Diamond Tools," Movie—"Diamond Mining in South America," Koebel Diamond Tool Co., Arthur Hill Tech., Saginaw, Mich., Oct. 28. Four more equally informative meetings are being organized.

1958-59 Chapter officers include: **R. C. Moore,** Pres.; **William Bendle,** First Vice-Pres.; **Phillip Blanchard,** Second Vice-Pres.; **John M. Diem,** Sec'y, and **Thomas Hancock,** Treas. Officers for 1959-60 are: **William Bendle,** Pres.; **Phillip Blanchard,** First Vice-Pres.; **G. A. Potter,** Second Vice-Pres.; **John M. Diem,** Sec'y; **Thomas Hancock,** Treas., and **R. C. Moore,** National Delegate.

Cylindrical Grinding Problem Undertaken at Boston Meeting

Paul Floyd, Vice-President of Waltham Grinding Wheel Co., was guest speaker at the March 24 Boston Chapter meeting held at the Alumni House of the Massachusetts Institute of Technology. He opened his remarks by stating that he thought the best way to keep up an interest in a technical society, whose membership is usually made up of many competing salesmen as well as users, is to present a problem common to all and let them work on it together. He suggested a "brainstorming session," which was made up of ten basic questions and their relationship to a problem on cylindrical grinding. He dubbed these "The Boston Ten." A complete report on the discussion is given in its entirety below.

THE BOSTON TEN

A Statement of a Cylindrical Grinding Problem

This summary represents a joint effort of users and suppliers to outline in detail the elements in a cylindrical grinding job.

By the use of the "brainstorming" technique, each person attending the meeting was given the opportunity to contribute his ideas on each of the ten divisions; thus the summary represents a joint contribution of every person present. It is felt that a clear statement of the problem can be of definite assistance in arriving at a successful solution. The solution itself is not attempted here. Each company will have its own suggestions in that regard.

1. Part to be Ground.
   a. Size.
   b. Shape.
   c. Weight.
   d. Area of Contact.
   e. Condition of Surface.
   f. Continuity of Contact.
   g. Physical Strength (thin wall).
2. What Do You Want to Do With the Part?
   a. Stock removal per pass.
   b. Finish required—free of injury and rms.
   c. Shape to be produced.
   d. Tolerances—run out—concentricity.
   e. Grinding pattern.
   f. Rough now and finish later?
   g. Production or regrind.
3. Grindability (resistance to abrasion).
   a. Name of material.
   b. Analysis.
      Carbon—other important elements.
   c. Hardness.
   d. Grain structure.
   e. Metallurgical aspects.
   f. Chemical reaction.
   g. Finishability.
4. Method of Inspection.
   a. Comparative or other testing after removal from machine.
   b. Testing on machine.
   c. Visual or machine tested for finish.
   d. Magnaflux or etch.
   e. Residual stress.
   f. Reflectivity.
   g. Smear removal and checking under surface.
5. Machine.
   a. Make and model.
   b. Condition.
   c. Power.
   d. Has machine been modified?
   e. Mounting.
   f. Speed constant or variable?
6. Special holders or supports for part.
7. Grinding Wheel.
   a. Speed.
   b. Method of dressing.
   c. Shape of face.
   d. Size new.
   e. Take off stub size.
8. Work Speed.
   a. In surface feet per minute.
   b. Rate of traverse.
9. Coolant.
   a. Dry or wet.
      (1) Straight cutting oil. Is it super fat? Is it chlorinated? Is it sulphurized?
   b. Method of application—flood or spray.
   c. Will the coolant affect the action of the wheel?
   d. Will it prevent rust?
   e. Is the coolant compatible with the material being ground and the following operations?
   f. Is coolant filtered?
10. Method of Wage Payment.

Reprints Available

Better Diamond Dressing for Precision Grinding
Effects of Materials on Snagging Wheel Performance
Flap-Type Coated Abrasive Wheels
How Good Are Man-Made Diamonds?
When and How You Can Use Crush Form Grinding
Centerless Grinding 35c
Organizing and Operating a Precision Barrel Finishing Dept. 35c
Standard Time Data $1.00

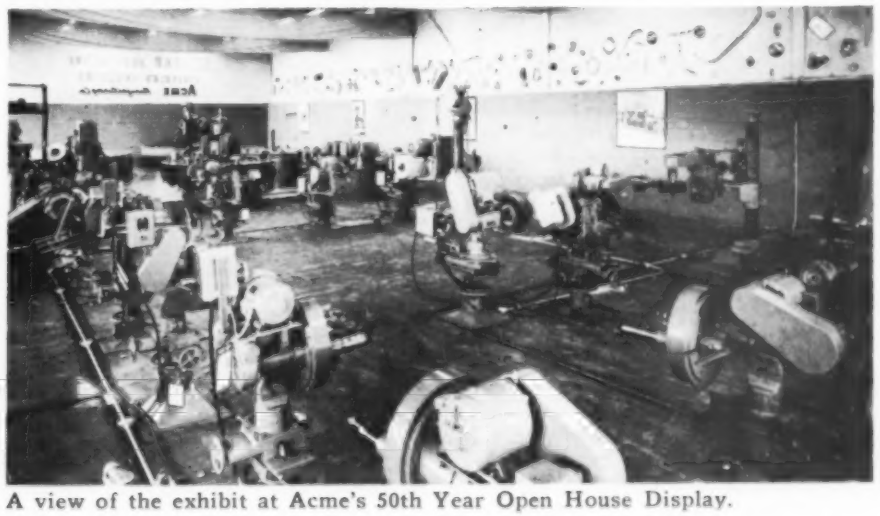
GRINDING and FINISHING
Hitchcock Publishing Co.
Wheaton, Ill.

News from the Industry

Acme Celebrates 50th Year in Manufacturing Polishing and Buffing Machines

The 50th Year Open House was held by the Acme Manufacturing Co. of Detroit, polishing and buffing machine manufacturer, at their plant at 1400 E. Nine Mile Rd., June 15-19. The company was founded in 1910 by Gustave A. Carlson. Now living in Florida, he was active in the business until 1947. Since that time, his two sons, Glen A. and George R., managed the firm in the capacities of President and Vice-President.

The present 90,000 sq. ft. manufacturing plant of Acme Manufacturing Co.

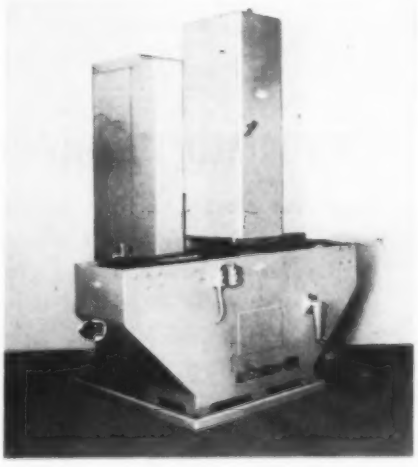


A view of the exhibit at Acme's 50th Year Open House Display.

The new Acme in-line type universal straight-line automatic machine which provides maximum compactness and flexibility for high production polishing and buffing operations. Approximate floor space required, 15'x20', 7' high.

Today Acme builds a complete line of straight-line automatic polishing machines, indexing and continuous rotary automatic machines, adjustable polishing lathes, deburring and special-purpose machines. In the past few years they have turned their attention to the sheet polishing and flat stock polishing field. On display at the exhibit were adjustable lathes, semi-automatic lathes, rotary automatics, straight line automatics, flat stock polishing and grinding machines, and special machines.

The present location of the plant is its second and it has already been expanded three times. Acme is associated also with several other companies related to the polishing and buffing fields. In 1955, Acme Maschinenfabrik GmbH was formed and a plant was built in Neu-Isenburg, Germany (Frankfort area) to build Acme machines.



Model KC flat polishing and grinding machine, with a conveyor belt feed, performs operations on stock up to 15" wide, 8" thick.

Taft-Peirce to Manufacture European Machine Tool Line

Under the terms of an agreement reached with the West German machine tool firm of Supfina-Wieck & Hentzen, the Taft-Peirce Manufacturing Co. of Woonsocket, R.I., now has exclusive rights to the manufacture and sale of the complete Supfina line of Microstoning machine tools and machine tool attachments in this country.

Microstoning is an abrasive final

WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

Full 1/3 h.p. G. E. Motor

At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little..

complete with cord, plug, switch ready to use

$89.95

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION

333 Nassau Avenue Brooklyn 22, N. Y.

Use postpaid card. Circle No. 236

SIA

Do you know what SIA means? SIA is the brand for the well known Swiss coated abrasives. It is a guarantee.

SIA products are the result of a long experience, continuous research and careful control. They are supplied for all needs of modern industry. Don't miss to write for details and prices. There are good reasons!

Swiss
Industrial Abrasives Ltd.
Frauenfeld/Switzerland

SIA

Use postpaid card. Circle No. 237

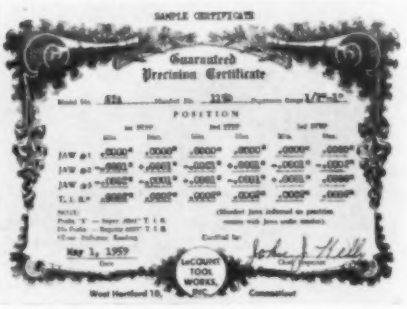
finishing operation said to generate controlled finishes on the outside surfaces of metals and other materials, and to correct errors in work geometry caused during previous machining operations. It is expected that this process will be used for improving the surfaces of rolls used for processing metals and plastics, among other uses.

Sundstrand Corp. Adds Abrasive Belt Grinder Line

Sundstrand Corporation of Rockford, Ill., has added a precision abrasive belt grinder line to its Sundstrand Machine Tool operation. Addition of this new line resulted from the acquisition of the inventory of Engelberg Inc., Syracuse, N.Y.

Engelberg will continue to manufacture part of the line as a subcontractor. Sales will be handled through the Sundstrand Machine Tool sales office in Belvidere, Ill.

Le Count Certifies Accuracy of Their Mandrels


SAMPLE CERTIFICATE

Guaranteed Precision Certificate

POSITION

May 1, 1959

LE COUNT TOOL WORKS, INC.

West Hartford 10, Connecticut

Le Count Tool Works Inc., 38 Cody St., West Hartford 10, Conn., is said to be the first manufacturer of fine tools to give an exact guarantee to their products.

With each Count-Centric expanding mandrel shipped by Le Count is a guaranteed Precision Certificate, showing, on as many as twelve different di-

B-H-S Machinery Holds Open House

A crowd gathers around the Visual Grinder, one of the eighteen Brown & Sharpe machine tools displayed in operation at the open house held by the B-H-S Machinery Co., South San Francisco, Calif. This announced the firm's appointment as northern California representative for Brown & Sharpe. Over 2500 attended. This grinder, by a system of lights, lenses, and mirrors, portrays the object in the machine on a screen and allows for precision work by the operator from a glass or print layout.

PREFORMED TUMBLING MEDIA AND ABRASIVES

Does your present tumbling media plug the slots? Pick the proper size, shape and bond hardness required. At present we have six varying hardnesses of ceramic bonds. We vary sizing or coarseness of abrasive to meet the finish required. To meet present demands we now make over two hundred sizes, shapes and bonds. Tell us about your finishing problem.

We have distributors throughout the U. S. and Canada.

FORTUNE INDUSTRIES, INC.

11770 Dexter Road Chelsea, Michigan

Phone GReenwood 9-3621

Use postpaid card. Circle No. 238

ameters, the exact T.I.R. (total indicator reading) in tenths of thousandths. In the accompanying instructions to the purchaser, they urge that the mandrel be checked by a tool inspector, to compare the accuracy of the mandrel with the enclosed certificate, before its acceptance by the purchaser.

Norton Co. Purchases Gould & Eberhardt Assets

Norton Co. of Worcester, Mass., has purchased the inventories, machinery and equipment, with drawings, designs and certain other assets of Gould & Eberhardt, Inc., of Irvington, N.J., one of the oldest machine tool manufacturers in the United States. These assets will be moved to Worcester in the near future.

Tumb-L-Matic Launches New Marketing Program

Tumb-L-Matic, Inc., Stamford, Conn., recently completed a survey mailing to over 1,000 dealers serving the metal finishing requirements of industry throughout the U. S. The purpose of the survey was to help management determine what the best possible pattern of distribution was for the company in meeting the need for finishing equipment and supplies in the plastics industry.

Aero Supply Enters New Industrial Field

Marketing plans for two new industrial products which include a new-type balancing wheel for grinders and a set of three infinitely adjustable balancing weights are being discussed here by officials of the Aero Supply Mfg. Co., Inc., Corry, Pa. They are (left to right): Edward J. Kaiser, Product Specialist; E. F. Pain, Vice-Pres. for Sales and Engineering; Clyde Keith, Vice-Pres. for Manufacturing; and W. H. Kafferlin, Chief Engineer. The firm is expanding into this new endeavor after more than 40 years as a pioneer aircraft parts manufacturer.

The **Metallurgical Products Dept.** of the **General Electric Co.**, Detroit, has appointed the following distributors of their Carboloy cemented carbide products: **Joplin Supply Co.**, Third and Joplin Streets, Joplin, Mo., covering sections of Mo., Okla., Kans., and Ark.; **Abrasives & Tools, Inc.**, 469 Southbridge St., Auburn, Mass., with territory including Worcester County in Mass. and the entire states of Vt. and N. H., and **E. C. Blackstone Co.**, 600 Madison Ave., Memphis, Tenn., with territory covering Tenn., Miss., Ark., Ala., and Mo.

The new Grind-A-Matic is an air turbine grinding head which can be mounted either vertically or horizontally on almost any machine tool.

Its versatile application and high precision performance allow Grind-A-Matic to perform grinding operations normally done on an expensive jig grinder. Mounted the same as any standard tool, it becomes a close tolerance grinder for such work as internal grinding of tools, dies and fixtures.

Threadwell

GRIND-A-MATIC

provides jig grinder performance at drill press prices

- *Fine radial adjustment from "0" to .070" while the spindle is rotating.*
- *Uninterrupted precision grinding*
- *Coarse adjustment from "0" through 1¼"*
- *Spindle speeds from 50 to 75,000 RPM*
- *Standard range from ⅛" to 2½" holes*
- *Adapted to include holes up to 5½"*
- *Sealed air turbine and spindle bearings*

Threadwell **THREADWELL TAP & DIE CO.**
Greenfield, Mass.

Use postpaid card. Circle No. 239

New
RAMPE 30 x 48

cuts big-job finishing costs

Real cost-saving is only part of the story with this newest, most productive Rampe machine. In 30 x 32 or 30 x 48 sizes, with one to three compartments, it gives you broad usefulness, simple operation, and the rugged dependability recognized in all Rampe precision finishers. Variable speed drive 8 to 25 rpm, "No-Seam" vinyl-lined barrels, and a wide selection of control accessories give real flexibility. Find out how you can cut costs . . .

write for details on Model 30x32 or 30x48 today.

RAMPE MFG. CO.
14915 WOODWORTH AVE., CLEVELAND 10, OHIO

Use postpaid card. Circle No. 240

NEWS OF INDUSTRY *continued*

Wilton Tool Chooses President

Alex J. Vogl has been appointed to the office of President, and **William Ferrick** to the office of Vice-President-Sales Manager by the Wilton Tool Manufacturing Co. Inc., Schiller Park, Ill. Vogl and Ferrick formerly held the titles of General Manager and Sales Manager, respectively. They have helped to shape Wilton into one of the country's foremost clamping tool manufacturers.

A. J. Vogl

W. Ferrick

Four top level promotions at Simpson Optical Manufacturing Co., Chicago, Ill., have been announced. They are as follows: **Edward E. Bickel**, Vice-President-Engineering; **William T. Strickland, Jr.**, Vice-President-Manufacturing; **James E. Curtin**, Vice-President-Sales, and **Franklin A. Biber**, Assistant Secretary and Controller.

E. E. Bickel

W. T. Strickland, Jr.

Burleigh L. Owens has been named Manager of Industrial Sales for the Atkins Saw Division, Borg-Warner Corp., Indianapolis, Ind.

Jesse R. Moore was appointed as Central Division Manager responsible for the sales of Atkins-Borg Warner products in 14 midwestern states.

Alfred C. Ekberg has been named District Manager at the San Francisco office of Pratt & Whitney Co., Inc., West Hartford, Conn. He succeeds **Ernest P. Haquette**, who has retired from the company after 42 years of service.

B. L. Owens

J. R. Moore

P. W. Crane

R. A. Didday

P. Willard Crane, Director of Research, was elected Vice-President of The Cincinnati Milling Machine Co. at a recent meeting of the Directors. Directors of Cincinnati Milling and Grinding Machines, Inc. (Cincinnati Milling's sales subsidiary) elected **Richard A. Didday** Vice-President.

ACCURACY .0002 T.I.R.

.0002 T.I.R. or less at Spindle Nose, .0005 T.I.R. or less on Test Arbor six inches from Spindle Nose

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

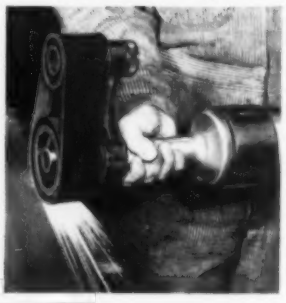
No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.

Clip ad to your letterhead and send for Literature

K. O. Lee Company, Aberdeen, S. D.

Use postpaid card. Circle No. 241

It takes 30 years to save you minutes!



Airetool has been making pneumatic tools for 30 years. During that time we have developed a number of new innovations in construction and design that make Airetool equipment the most efficient you can use. That's why Airetool's Model 700 horizontal grinder, above, and Model 500 horizontal die grinder help you get more production and better results than other similar tools. Write us for demonstration or Catalog No. 67.

Abrasive Belt attachment for Airetool horizontal grinders. Ideal for fine finishing dies, molds, seam welds, any contour surface.

OFFICES AND REPRESENTATIVES in principal cities of U. S. A., Canada, Mexico, Puerto Rico, South America, Europe, Italy, England, Japan, Hawaii.

CANADIAN PLANT: 37 Spalding Drive, Brantford, Ontario

EUROPEAN PLANT: Vlaardingen, The Netherlands

AIRETOOL MANUFACTURING COMPANY SPRINGFIELD, OHIO

Use postpaid card. Circle No. 242

L. S. Hilton

C. D. McCarty

R. M. Furlaud

R. Bryce

J. E. Williams

E. Quastler

L. S. Hilton has been appointed Manager of the Abrasive and Diamond Wheel Departments of the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N.J. He succeeds **J. A. Lange** who requested to be relieved of managerial responsibilities in order to devote his knowledge and 43 years experience to improving methods and quality. **C. Fleming, Jr.** has been appointed Production and Development Manager.

Charles D. McCarty of 4105 Central Ave. Pike, Knoxville, Tenn., has been issued a franchise for the distribution of buffs and related products for metal finishing manufactured by the Schaffner Mfg. Co., Inc., Pittsburgh. His territory covers the state of Tennessee.

Richard M. Furlaud, General Counsel of Olin Mathieson Chemical Corp., New York City, has been named a Corporate Vice-President, and **Richard Bryce**, formerly First Assistant Treasurer, succeeds **Earl R. Van Vliet** who has retired, as Treasurer of the corporation. **J. E. Williams**, formerly in charge of the corporation's Metals Division, has been appointed Corporate Vice-President for Manufacturing Services and a member of President Stanley de J. Osborne's staff.

Ernest Quastler has been appointed Plant Manager of the Ex-Cell-O Corp. of Canada, located in London, Ont. He joined Ex-Cell-O in 1953, having an excellent background of both education and experience in tooling and production methods and production supervision.

Charles E. Bagwell, who joined the firm in 1956 as Chief Engineer, has been elected to the Board of Directors of the Hanson-Van Winkle-Munning Co., Matawan, N.J. **Peter Arnold** has been promoted to the sales engineering staff.

C. E. Bagwell

P. Arnold

1—U.S. Electrical Tool Grinder—Model 500—with 3 HP Motor 3/60/440 volts with ½ HP Dust Collector. Practically new—$275.

M. ELSTEIN

426 Grand St., Jersey City 2, N.J.

TURNABLE

the diamond tools with a **NEW TWIST!**

Cost No More—Last Longer!

A flick of the **wrist** *and your diamond is* **turned!**

Pat. #2-761-441

The Only Diamond Tool with **BUILT-IN TURNER!**

ORDER ONE TODAY!

Shank and diamond sizes for all grinders. Send for FREE detailed literature. Distributor inquiries invited.

CITCO *solid copper diamond tools*

BOX 84, CHARDON, OHIO • AV-6-4124

Use postpaid card. Circle No. 243

DUSTKOP "520"

designed to collect dust from single machines

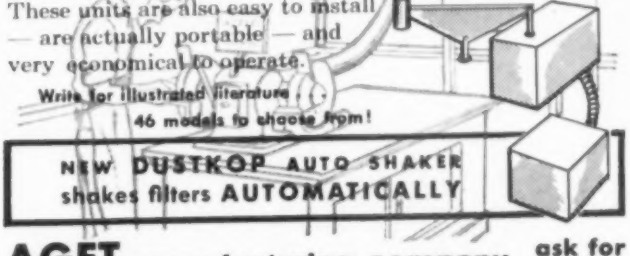
portable—easily installed

DUSTKOP STOPS DUST

Self-contained Dustkop models, like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

Write for illustrated literature . . .

46 models to choose from!



NEW **DUSTKOP** AUTO SHAKER shakes filters **AUTOMATICALLY**

AGET manufacturing company

1380 E. Church Street, Adrian, Michigan

ask for details

Use postpaid card. Circle No. 244

James E. Martin

James E. Martin has been appointed Cleveland District Manager for the Pangborn Corp., Hagerstown, Md. His headquarters will be at 9802 Euclid Ave., Cleveland. He succeeds **Robert E. Donnelly** who recently retired after 30 years' service with the Pangborn Corp.

H. H. Whitmore was elected Executive Vice-President at the Directors' meeting of the Jones & Lamson Machine Co., Springfield, Vt. Also elected was **J. C. Hebert** as Vice-President. **R. S. Jones** has assumed the title of General Manager.

H. H. Whitmore

J. C. Hebert

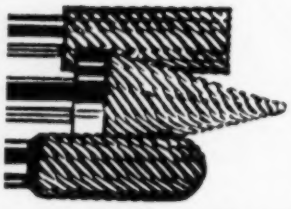
Commercial Filters Corp., Melrose, Mass., has promoted **John Kerber** as Manager of the company's New York office. His headquarters will be in Ridgefield, N.J. **Herbert A. Wilson** has been promoted as Eastern District Manager, with headquarters at the main office in Melrose.

Donald R. Roche has been appointed Assistant to the Manager, Cold Finished Bar Products, Jones & Laughlin Steel Corp., Pittsburgh. He has been a salesman in J&L's New York District Sales Office since 1955.

M. E. Dupre

M. E. Dupre has been appointed Vice-President-Public Relations of Van Norman Industries, Inc., New York City. He has been Advertising Manager of Van Norman since early 1958, joining the corporation after four years in the same capacity with the Morse Twist Drill & Machine Co. division in New Bedford, Mass.

WRITE FOR FREE CATALOG



- Ground Cut Rotary Files for Soft Metals.
- Hand Chisel Cut for Hard Metals.
- Carbide Rotary Files.
- Salvage and Regrinding Service.
- Dealers Inquiries Invited.

ROTA FILE CORP.

1328 58th STREET
BROOKLYN, 19, N. Y.

Use postpaid card. Circle No. 245

ANNOUNCING

The new **CRATEX**

TOOL & DIE MAKERS KIT

The world's finest rubberized abrasives for deburring, smoothing and polishing tools, dies, patterns, molds, models, instruments and component parts.

Kit contains 80 wheels and points in the most popular sizes and shapes, equally assorted in four grit textures, coarse (C), medium (M), fine (F), extra fine (XF)... plus four mandrels for ⅛" chuck... packaged in plastic box, compartmented for fast selection. $7.50 complete.

Order your new Cratex Tool & Die Makers Kit #777 through your distributor—or, send your order to us for delivery by the Cratex distributor nearest you.

CRATEX *Free 8-page catalog available on request.*

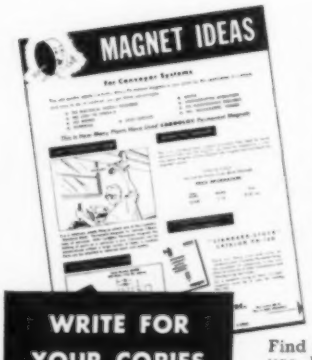
MANUFACTURING CO., INC.

1600 ROLLINS ROAD, BURLINGAME, CALIFORNIA

Use postpaid card. Circle No. 246

MAGNET

Ideas **CAN HELP YOU MAKE MANY BIG SAVINGS**



WRITE FOR YOUR COPIES TODAY!

IN TIME, MATERIALS, PRODUCTION COSTS!

Permanent magnets are as versatile as you wish to use them . . . literally there are 1001 ways they can help you produce better products.
Basically, Empire Alnico Magnets can hold, fasten, separate, pick-up or retrieve steel sheets or fabricated parts through practically every step of manufacturing.
First cost is the last cost! No electric energy, wiring or maintenance is required.

Find out how hundreds of manufacturers use Empire Magnets to save important time, materials and production costs or use them in their finishing products.

EMPIRE MAGNETICS INC.

111 E. Clinton St.
Maumee, Ohio
2908 S. LaCienega Blvd.
Culver City, Cal.

Use postpaid card. Circle No. 247

DISTRICT MANAGERS
GRINDING & FINISHING

EASTERN DIVISION

Dan E. Reardon, V.P. in charge
c/o Hitchcock Publishing Co.
55 West 42nd St., N.Y. 36, N.Y.
Telephone: LAckawanna 4-4528
Home Address: Box 1, South Glastonbury, Conn.
Telephone: MEdford 3-7083

New England

John Pickering, Jr.
c/o Hitchcock Publishing Co.
Box 29, Andover, Mass.
Telephone: GReenleaf 5-0499

Eastern N.Y. and N.Y. City, Eastern Penna., N.J., Md., Dela., D. of C., Va.

Ralph Payne
c/o Hitchcock Publishing Co.
55 West 42nd St., N.Y. 36, N.Y.
Telephone: LAckawanna 4-4528

CENTRAL DIVISION

Southern Half Cook County, Ill., Indiana

Henry Smith, V.P. in charge
c/o Hitchcock Publishing Co.
Wheaton, Ill.
Telephone: MOntrose 5-1000

Toledo, Ohio

James C. Stewart, V.P.
c/o Hitchcock Publishing Co.
Wheaton, Ill.
Telephone: MOntrose 5-1000

Michigan, except Upper Peninsula

William E. Jacobs
c/o Hitchcock Publishing Co.
10432 W. McNichols
Detroit 21, Mich.
Telephone: DIamond 1-9525

Illinois, Northern Cook County, Ill., Ia., Mo., Wisc., Upper Mich., South Dakata

Robert G. Bolinder
c/o Hitchcock Publishing Co.
Wheaton, Ill.
Telephone: MOntrose 5-1000

Western N.Y. State, Western Penna., Eastern Ohio

Ralph E. Helfrick
1507 Edgefield Road
Cleveland 24, Ohio
Telephone: HIllcrest 2-0189

WESTERN DIVISION

California, Arizona

Keith H. Evans
3723 Wilshire Blvd., Los Angeles 5, Cal.
Telephone: DUnkirk 8-2981 and
Room 225-515 Market St. Bldg.
San Francisco 5, Cal.
Telephone: YUkon 2-4280

Oregon, Washington

Lloyd Thorpe
766 Dexter Horton Bldg., Seattle 4, Wash.
Telephone: MAin 2-4363

Don't Miss these Features

GRINDING and FINISHING

CONTENTS FOR AUGUST 1959

20 The How and Why of Gaging
The introduction to a "round-up" on gaging for grinding, stressing general considerations for the selection of gages.

24 Straddle-bearings Provided in New Centerless Grinder
New centerless grinder design includes bearing support on both sides of grinding wheel and regulating wheel.

26 Finishes to Under One Microinch on Lathe
Attachment for tool post super-finishes flat or cylindrical surfaces to less than one microinch.

29 Finishing Aluminum Panels for Air Force Academy
Large drum sander solves problems in surfacing large panels of aluminum.

31 Semi-Automatic Gear Deburring Reduces Operation to Seconds
Large gears are semi-automatically deburred in seconds by use of reinforced wheel and air spindle.

37 Abrasive Industry Leaders Brief Young Engineers
Unique three-week program covers high-lights of abrasives for Alfred University ceramic engineering students.

Coming Next Month

Effects of Manufacturing Techniques on Grinding Wheel Use
The first of a group of articles concerning what every user should know about vitrified wheel manufacturing. Covers fundamentals, mixing and molding.

The How and Why of Gaging—Part II
The second article of this series deals with gage blocks and other master standards; with direct-reading instruments such as plug gages, ring gages and snap gages, as well as with micrometers and vernier calipers.

Zirconium Type Abrasives and Polishing Compounds
Status report on a new type of abrasive developed by Titanium Alloy Manufacturing Division of National Lead Company. Based on a lecture at the Alfred University Abrasives Symposium.

Grinding Compressor Vanes at Whirlpool
Compressor vanes in refrigerators must fit tightly, slide freely, last forever. A combination of grinding methods plus selective fitting solves the problem.

Snagging Stainless Steel Slabs
Mechanical snagging, doubled power, larger wheels boost production at large steel mill.

A GUARANTEE FOR YOUR CRYSTAL LAKE GRINDER

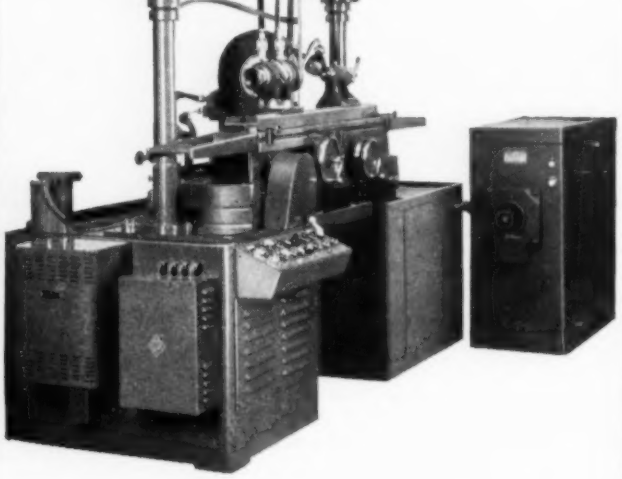
When purchasing a REX SUPERVAN HIGH SPEED STEEL SPINDLE for your Crystal Lake Grinder an additional $50.00 to the purchase price will give you a TWO YEAR SPINDLE GUARANTEE.

EASY OPERATION: CLOSE TOLERANCES:

ACCURACY: FINE MICROINCH SURFACE FINISH

A CRYSTAL LAKE GRINDER will hold size as well as grind round from .000005 to .000020" and finish from One to Four Microinch SURFACE FINISH. The essentials in grinding are a round spindle, taper bearings, a spindle that can be adjusted periodically without the squashing of bronze boxes and to have belt pressure ninety degrees from grinding pressure so the bronze boxes will not wear out of round.

For example, fuel injectors, after having been rough ground, can be ground to .000010" roundness with a sixty grit wheel and one pass of the wheel.



Write for literature

CRYSTAL LAKE GRINDERS
CRYSTAL LAKE MACHINE WORKS, INC.

Since 1910

CRYSTAL LAKE, ILLINOIS

Use postpaid card. Circle No. 248

Index to Advertisers

49 Abrasive Products, Inc.
61 Aget Manufacturing Company
60 Airetool Manufacturing Company
18 American Chain & Cable Company, Allison-Campbell Division

10 Blanchard Machine Company, The
13 Buckeye Tool Corporation

5 Carborundum Company
36 Cincinnati Electrical Tool Company, The
61 Cleveland Industrial Tool Company
50 Clover Manufacturing Company
Cortland Grinding Wheel Corporation—Second Cover
62 Cratex Manufacturing Company
64 Crystal Lake Grinders

51 Desmond-Stephan Manufacturing Company

54 Easco Products
42 Electromatic Products Company
30 Elgin National Watch Company
62 Empire Magnetics

17 Federal Products Corporation
58 Fortune Industries
12 Fuller Merriam Company

16 General Electric, Metallurgical Products Department

47 Hanchett Manufacturing Company
28 Harvey Manufacturing Company

6, 7 Industrial Distributors, Inc.

41 J & S Tool Company

48 Kuzmick, Paul L. Company

60 Lee, K. O. Company

16 Metallurgical Products Department, General Electric Corporation
Mid-West Abrasive Company—Fourth Cover
34 Murray-Way Corporation

14 Norton Company, Abrasive Grains
2, 3 Norton Company, Grinders
33 Norton Company, Wheels

44 Olson Filtration Engineers

48 Pekay Abrasive Company
Peninsular Grinding Wheels Sales Corporation—Third Cover

59 Rampe Manufacturing Company
62 Rota File Corporation
45 Roto Finish Company

40 Sundstrand-Artor Grinders
58 Swiss Industrial Abrasives, Ltd.

8 Thompson Grinder Company
59 Threadwell Tap & Die Company
46 Timesaver Sanders, Inc.

66 United Engineering & Foundry Company
4 United States Diamond Wheel Company
53 United States Electrical Tool Company

52 Vapor Blast Manufacturing Company

58 Walls Sales Corporation

A Final Thought

Control Non-Productive Labor Costs

You may remember an old cartoon showing a man shoveling snow off his sidewalk. He threw the snow over his shoulder and when he arrived at the end of the walk discovered that the snow he'd shoveled away in front had landed behind him and his walk was still knee-deep in snow. Industry could well be in danger of doing the same thing in the realm of productive and non-productive labor.

Automation, semi-automation and efficient utilization of improved methods have cut sharply into the productive labor force. The number of production workers is now less than it was in 1950 and their number will decline in the years ahead. In contrast, the number of non-production workers have increased in the same period. Thus, while management has decreased its productive labor force costs, it's increased its non-productive labor costs. This was inevitable. If one would improve methods, reduce costs and analyze production problems—if one would substitute machines for muscles, one must have people to design, build and service them. And so, much of the snow from in front is now behind!

There appears to be an area here for cost reductions. At first blush it might seem cold-blooded and unkind to suggest that the same people who have been instrumental in reducing productive labor costs should be subjects of analysis. Yet, good business management makes such investigations and analyses mandatory. High rewards may be reaped by business in this area because so very little scientific investigation has been carried on by industry in this field. Non-productive activities have grown, in many instances, willy-nilly to a point where money saved by reducing productive labor time is being eaten up by the non-productive which produced the savings in the first place.

There is no reason why the same reliable and proven measurements which have been applied so successfully to line cannot be adapted to staff functions. Analysis, measurement, standards, incentives and other tried techniques can be used with worthwhile results. To be sure, there will be areas where accepted techniques defy application, here new methods must be introduced and it could well be that an entirely new interpretation of a system may be developed. This would be a definite contribution to sound management practice which the engineering profession could make.

One must not be unmindful that giant-like strides have been made by the business machine manufacturers to automate office procedures; however, there remain many areas which do not lend themselves to mechanical operation and where any improvement, however small, will pay big dividends. Such improvements will primarily be in the realm of better utilization of the brains, imagination and abilities of people.

If we must shovel the sidewalk, let's not throw the snow behind us.

Wm. J. Schleicher

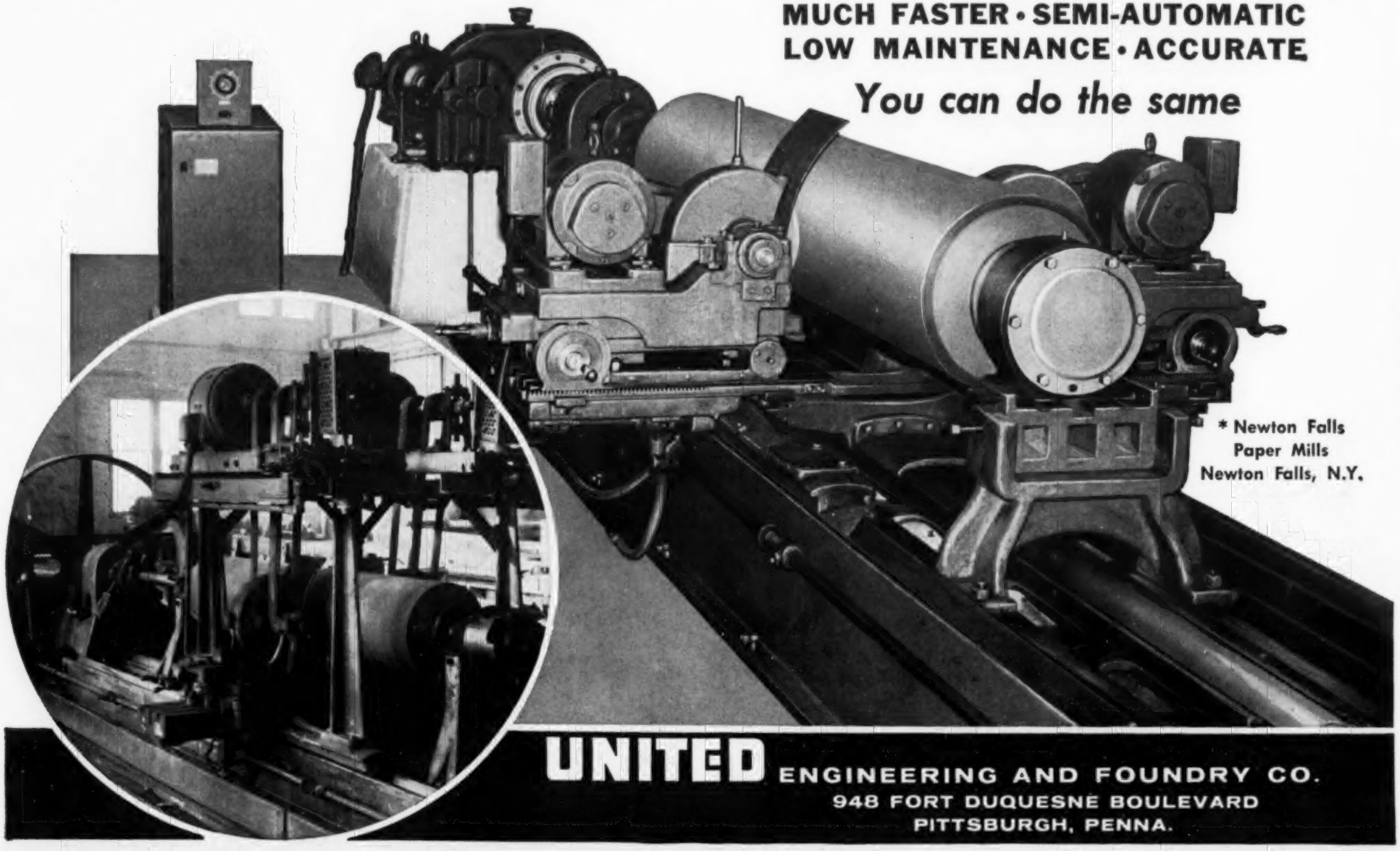
Vice President & Editorial Director

NEWTON FALLS* MEETS TODAY'S SPEED-UP

Modernizes Their LOBDELL Roll Grinder

MUCH FASTER • SEMI-AUTOMATIC
LOW MAINTENANCE • ACCURATE

You can do the same



* Newton Falls
Paper Mills
Newton Falls, N.Y.

UNITED ENGINEERING AND FOUNDRY CO.
948 FORT DUQUESNE BOULEVARD
PITTSBURGH, PENNA.

Use postpaid card. Circle No. 249

SNAG-MASTER

B-29

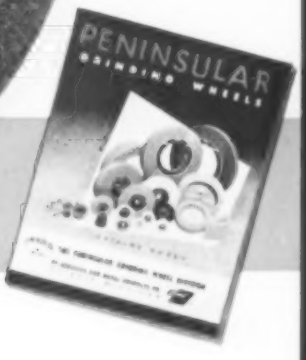
by PENINSULAR

an important double-duty development offering much longer life

PLUS FASTER GRINDING . . .

Use Snag-Master on your difficult stand jobs . . . enjoy at no added cost its profitable combination of extra life and better grinding. Here is a regularly priced wheel that does what everyone said couldn't be done—lasts much longer and, at the same time, grinds faster than any other available abrasive unit.

Make certain you are not missing something! A Peninsular engineer will gladly test a Snag-Master Grinding Wheel on any of your toughest casting-grinding jobs . . . write or phone us today.



Learn more about Snag-Master from the descriptive and informative catalog sent upon request. No obligation!

PENINSULAR

GRINDING PENINSULAR WHEELS

District Representatives and Distributors in All Principal Cities

PENNINSULAR GRINDING WHEEL COMPANY 725 MELDRUM AVENUE DETROIT 7, MICHIGAN

MID-WEST

the one source for all of your abrasive needs

Mid-West Abrasive Company is one of only three abrasive companies offering a complete line of abrasive products to its customers. Sandpaper, grinding wheels, honing stones, abrasive grain and grinding machines are produced with consistent high quality. That's why Mid-West's list of satisfied customers grows steadily each year.

In addition to quality products, Mid-West also provides the unusual benefits of engineered installation by skilled abrasive engineers. And, these highly trained abrasive specialists are available to *anyone* having abrasive problems.

If you are having problems with your present applications, new set-ups or quality control, our specialized Product Sales Engineers will be happy to discuss them with you without any obligation whatsoever. A call or letter today will bring prompt response . . . and possible savings on *your* future operations.

MID-WEST ABRASIVE CO.

510 S. Washington St. • Owosso, Michigan

Use postpaid card. Circle No. 203